Panasonic®

PROGRAMMABLE CONTROLLER

FP3
C-NET LINK UNIT
Technical Manual

FP3 C-NET LINK UNIT Technical Manual
ACG-M0031-1 '92.11

Matsushita Electric Works, Ltd.

Safety Precautions

Observe the following notices to ensure personal safety or to prevent accidents.
To ensure that you use this product correctly, read this User's Manual thoroughly before use.
Make sure that you fully understand the product and information on safe.
This manual uses two safety flags to indicate different levels of danger.

WARNING

If critical situations that could lead to user's death or serious injury is assumed by mishandling of the product.

-Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
-Do not use this product in areas with inflammable gas. It could lead to an explosion.
-Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.

CAUTION

If critical situations that could lead to user's injury or only property damage is assumed by mishandling of the product.

-To prevent abnormal exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assure in these specifications.
-Do not dismantle or remodel the product. It could lead to abnormal exothermic heat or smoke generation.
-Do not touch the terminal while turning on electricity. It could lead to an electric shock..
-Use the external devices to function the emergency stop and interlock circuit.
-Connect the wires or connectors securely.
The loose connection might cause abnormal exothermic heat or smoke generation
-Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It might cause exothermic heat or smoke generation.
-Do not undertake construction (such as connection and disconnection) while the power supply is on.

Copyright / Trademarks

CONTENTS

CHAPTER 6: COMMANDS

CHAPTER 7: TROUBLE SHOOTING

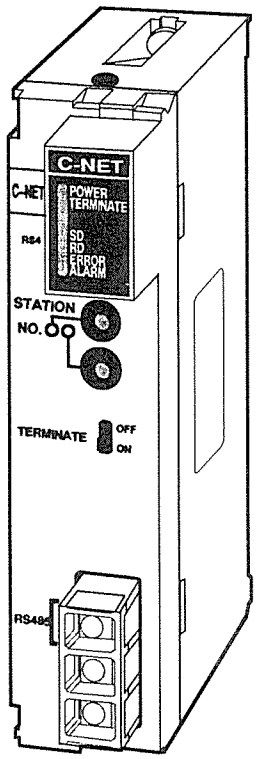
CHAPTER 8: APPENDIX

CHAPTER 1

FEATURES AND SYSTEM CONFIGURATIONS

"PC" is an abbreviation of Programmable Controller.

1-1. Features



The FP3 C-NET Link Unit enables communication between Programmable Controllers (PCs) and a computer. The C-NET Link Unit is installed on a Master Backplane in the FP3 Programmable Controller (PC) and is connected to a computer and other C-NET Link Units or C-NET Adapters through an RS485 serial communications port.

Easy monitoring and maintenance of Programmable Controllers (PCs) (Computer Link)

Allows you to monitor the data and relays in an operating Programmable Controller (PC), and to send data to a Programmable Controller (PC) from the computer.

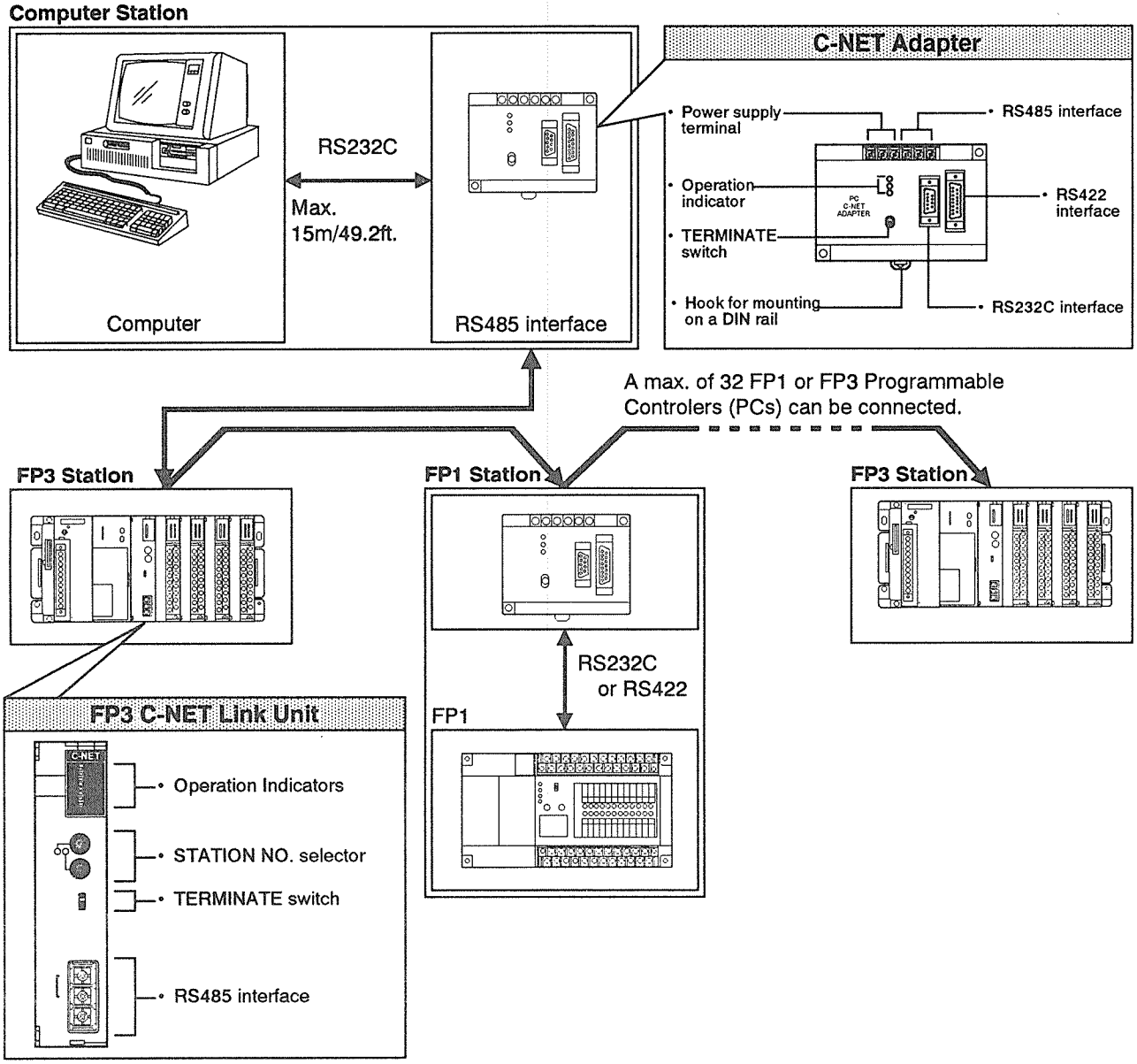
Up to 32 Programmable Controllers (PCs) can be linked

Allows you to connect a maximum of 32 Programmable Controllers (PCs) to one computer. Although the C-NET is built with an RS485 communications port, a computer's RS232C interface is available. The C-NET Adapter (RS232C/RS485 Conversion Adapter), which connects between the computer and a Programmable Controller (PC), will convert between RS232C signal and those of the RS485 interface.

With a 2-conductor cable, the C-NET can communicate with a computer or other Programable Controllers (PCs) up to 1,200m/3,937ft. away.

1-2. System Configurations

Communication Network System



- One C-NET Link Unit or C-NET Adapter is required for each station.
  - Computer station :C-NET Adapter
  - FP1 station :C-NET Adapter
  - FP3 station :C-NET Link Unit

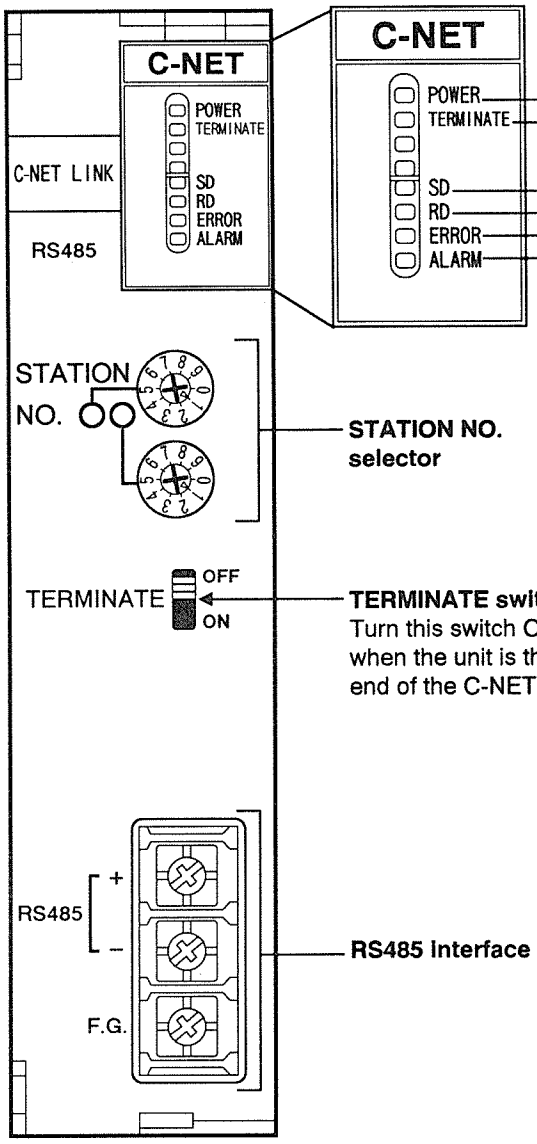
CHAPTER 2

C-NET LINK UNIT

"PC" is an abbreviation of Programmable Controller.

2-1. Parts Terminology and Functions

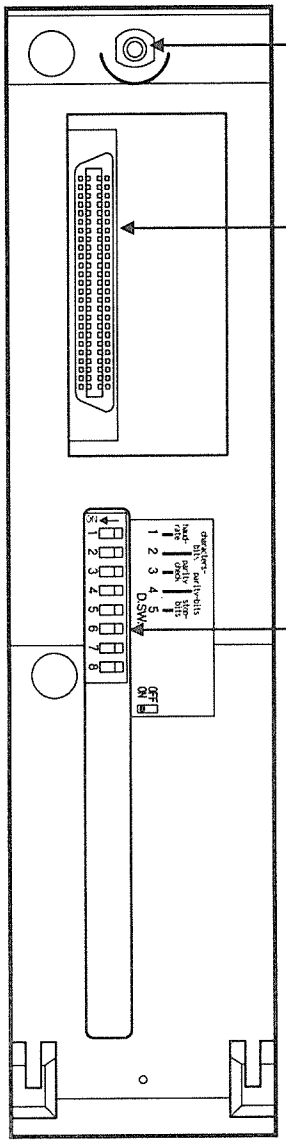
Front Panel



POWER LED (green)	ON	: when power is present
	OFF	: when power is not
TERMINATE LED (green)	ON	: when the TERMINATE switch is ON
	OFF	: when the TERMINATE switch is OFF
Send Data Monitor LED (green)	Flashes	: when sending
	OFF	: when not sending
Receive Data Monitor LED (green)	Flashes	: when receiving
	OFF	: when not receiving
ERROR LED (red) (Communication error)	ON	: communication error *
	Flashes	: unit number setting error
	OFF	: normal communication
ALARM LED (red) (Unit error)	ON	: unit error (Watchdog timer error occurred.)
	OFF	: normal unit operation

* The "ERROR" LED will be turned ON when a parity error, a frame error, or a BCC error occurs.

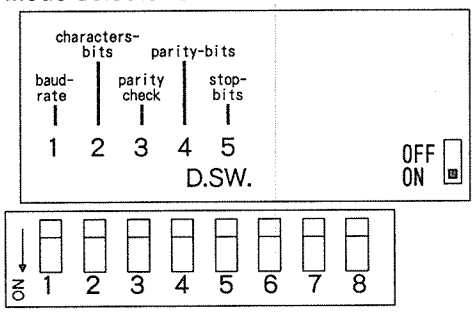
Rear Panel



Mounting Screw:
A screw for attaching the unit to a Master Backplane.

Connector:
Connects to the slot on the Master Backplane.

Mode Selector Switches:



Switch Number	Specifications		Switch position							
			1	2	3	4	5	6	7	8
1	Baud rate	19,200bps	OFF						–	
		9,600bps	ON						–	
2	Character bit	7-bits		OFF					–	
		8-bits		ON					–	
3	Parity check	Invalid			OFF				–	
		Valid			ON				–	
4	Parity bit	Odd parity				OFF			–	
		Even parity				ON			–	
5	Stop bit	1-bit					OFF		–	
		2-bit					ON		–	

2-2. Specifications

1. General Specifications

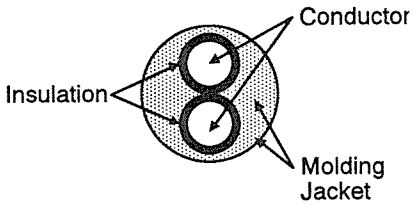
Item	Description
Current consumption	350 mA or less (at 5 V DC)
Ambient temperature	0 ℃ to 55 ℃ / 32 ℉ to 131 ℉
Ambient humidity	30 % to 85 % RH(non-condensing)
Storage temperature	− 20 ℃ to 70 ℃ / − 4 ℉ to 158 ℉
Storage humidity	30 % to 85 % RH(non-condensing)
Insulation resistance	100 MΩ or more, Across input terminal and Frame Ground Terminal (measured with a 500 V DC megger test)
Vibration resistance	10 Hz to 55 Hz, 1 cycle/min ; double amplitude of 0.75 mm / 0.030 in., 10 min on 3 axes
Shock resistance	Shock of 98 m/s^2 or more, 4 times on 3 axes
Noise immunity	1,000 Vp-p with pulse widths of 50 ns and 1 μs (based on in-house measurements)
Operating environment	Free from corrosive gases and excessive dust
Number of I/O per C-NET Link Unit	16 points (can be allocated as 0 using NPST-GR)
Weight	Approx. 240g / 8.466 oz

2. Performance Specifications

Item		Description
Interface		RS485, one port
Baud rate		9,600 bps or 19,200 bps (selected by DIP switch)
Communication method		Two-line, half duplex
Communications		Asyncronous
Transmission distance		Total 1,200 m / 3,937 ft.
Terminate resistance		120 Ω
Transmission cable		2-conductor cable(VCTF) or Twisted pair cable (Refer to page 10 " 3. Cable Specifications ".)
Transmission format		ASCII
Transmission data framing	stop bits	1-bit / 2-bit
	parity	Invalid / valid (even/odd)
	character bits	7-bit / 8-bit
Byte transmission order		Low bit first
Computer link format	Transmission unit	Header (%) to terminator (CR)
	Maximum message length	Max. 118 characters / frame (including % and CR)
No. of stations		Max. 32 stations / computer(excluding computer station)

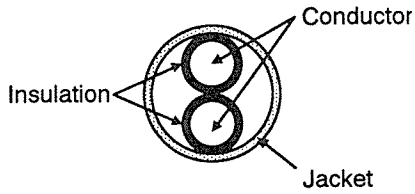
3. Cable Specifications

Vinyl Cabtyre Cable (VCTF) : 2-conductor



- Conductor :
  - Size : Min. 0.75 mm² (AWG 18 or lager)
  - Resistance : Max. 25.1 Ω/km (at 20 ℃)
- Cable :
  - Insulation thickness : Min. 0.6 mm / 0.024 in.
  - Molding jacket diameter : Min. 6.6 mm / 0.260 in.

Twisted Pair Cable : 1-pair



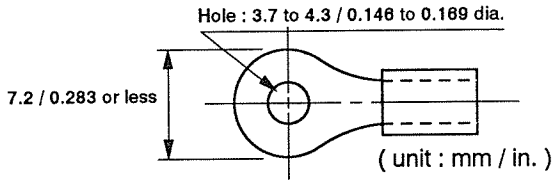
- Conductor :
  - Size : Min. 0.5 mm² (AWG 20 or lager)
- Cable :
  - Insulation material : Polyethylene
  - Insulation thickness : Min. 0.5 mm / 0.020 in.
  - Jacket diameter : Min. 1.5 mm / 0.059 in.

Crimp Terminal

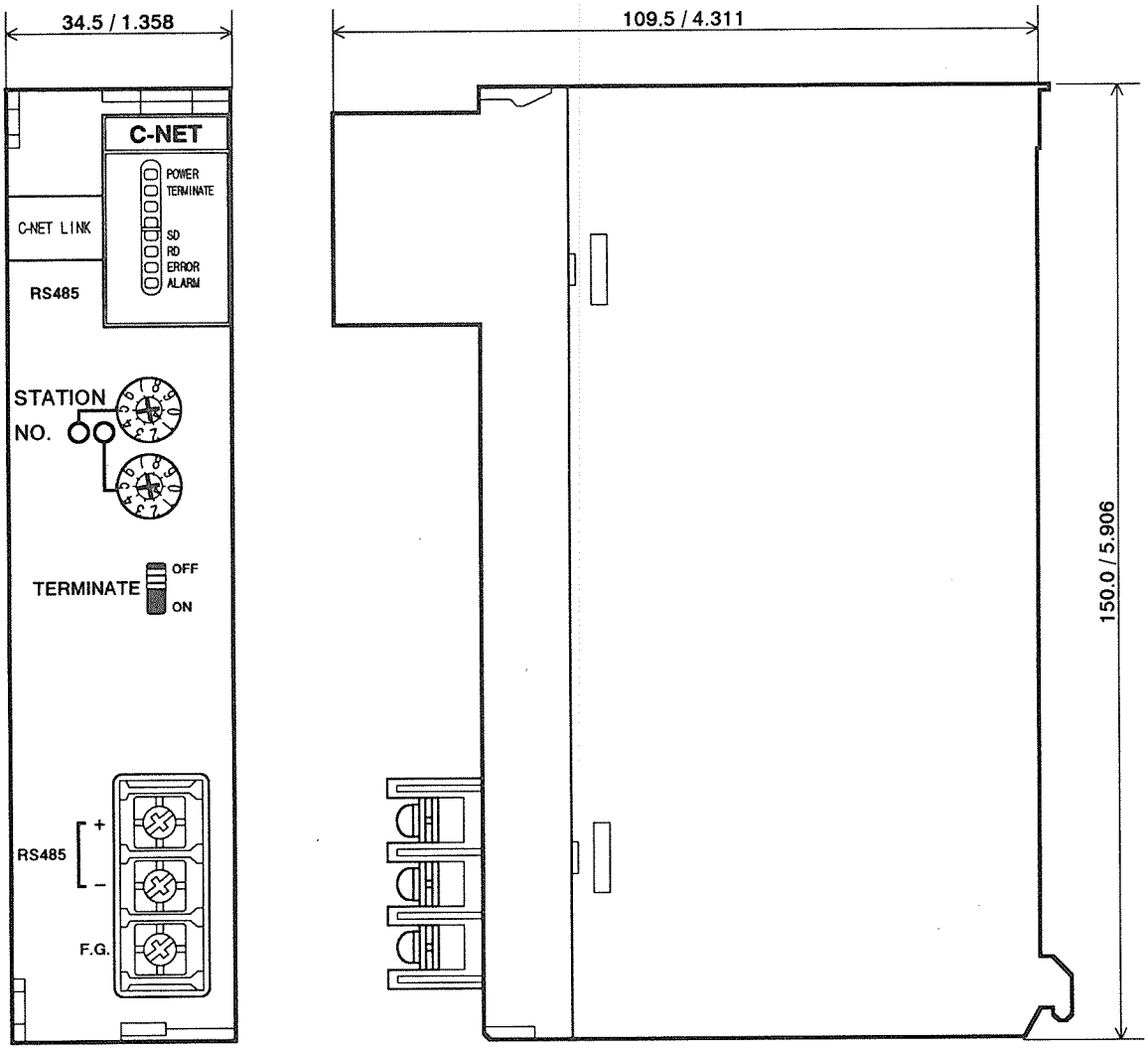
Be sure to connect the cables and the interface terminals correctly using crimp terminals.

Suitable crimp terminals :

- Ring round terminal
- Insulated ring terminal
- Fork terminal



2-3. Dimensions



(unit : mm / in.)

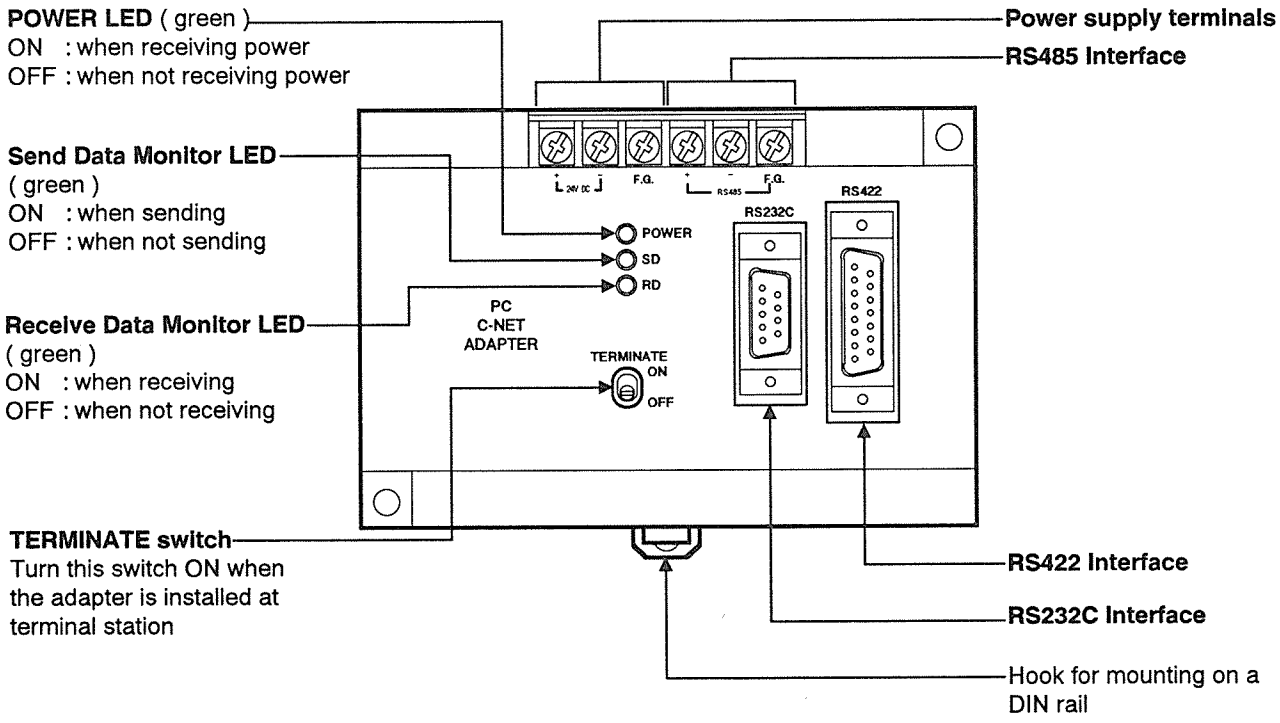
CHAPTER 3

C-NET ADAPTER

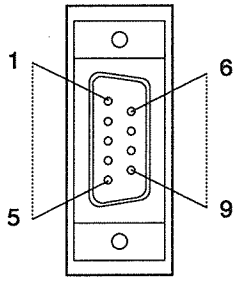
"PC" is an abbreviation of Programmable Controller.

3-1. Parts Terminology and Functions

The C-NET Adapter converts the communication format from that of an RS232C or RS422 interface to that of an RS485 interface.
The adapter is required to convert the format normally used by a computer (RS232C) to that used by the C-NET Link Unit (RS485).



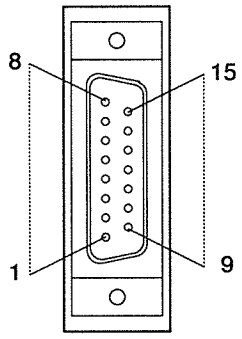
C-NET Adapter
RS232C Interface (Female)



Pin Number	Specifications	Direction C-NET / Computer
1	FG	—
2	SD (TXD)	→
3	RD (RXD)	←
4	RS (RTS)	→
7	SG	—
9	ER (DTR)	→

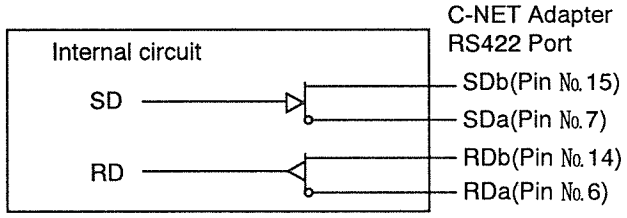
- Pin Number 1 "FG" of the C-NET Adapter is not connected to the FG (Frame Ground) terminal of its RS485 interface.
- The signals on pins 4 "RS(RTS)" and 9 "ER(DTR)" are always held high(ON).

C-NET Adapter
RS422 Interface (Male)



Pin Number	Specifications	Direction C-NET / FP1
6	RDa	←
7	SDa	→
8	FG	—
14	RDb	←
15	SDb	→

- The C-NET Adapter RS422 interface is dedicated for connection to the FP1 RS422 interface.
- When connecting, use an FP1 Peripheral Cable (AFP15205 or AFP1523).
- The specifications for connecting a C-NET Adapter's RS422 interface are shown below :



3-2. Specifications

1. General Specifications

Item	Description	
	AC Type	DC Type
Rated Operating voltage	100 to 240 V AC	24 V DC
Operating voltage range	85 to 264 V AC	20.4 to 26.4 V DC
Current consumption	300 mA or less (at 100 V AC) 200 mA or less (at 200 V AC)	100 mA or less
Ambient temperature	0 ℃ to 55 ℃ / 32 ℉ to 131 ℉	
Ambient humidity	30 % to 85 % RH(non-condensing)	
Storage temperature	− 20 ℃ to 70 ℃ / − 4 ℉ to 158 ℉	
Storage humidity	30 % to 85 % RH(non-condensing)	
Insulation resistance	100 MΩ or more, Across input terminal and Frame Ground Terminal (measured with a 500 V DC megger test)	
Vibration resistance	10 Hz to 55 Hz, 1 cycle/min ; double amplitude of 0.75 mm / 0.030 in., 10 min on 3 axes	
Shock resistance	Shock of 98 m/s^2 or more, 4 times on 3 axes	
Noise immunity	1,000 Vp-p with pulse widths of 50 ns and 1 μs (based on in-house measurements)	
Operating environment	Free from corrosive gases and excessive dust	
Weight	Approx. 320g / 11.288 oz.	Approx. 230g / 8.113 oz.

2. Performance Specifications

Item	Description
Interface	RS485 × 1port, RS422 × 1port, RS232C × 1port
Conversion format	Between RS232C and RS485 interfaces Between RS422 and RS485 interfaces
Terminating resistance	120 Ω

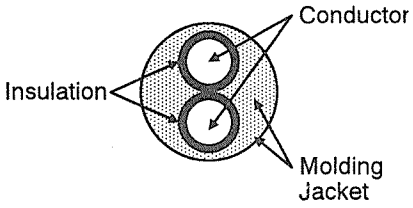
Note :

- The baud rate, the transmission framing and like those are specified at the computer and the Programmable Controller(PC) sides.

3. Cable Specifications

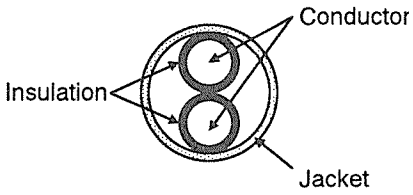
Vinyl Cabtyre Cable (VCTF) : 2-conductor

- Conductor :
  - Size : Min. 0.75 mm² (AWG 18 or lager)
  - Resistance : Max. 25.1 Ω/km (at 20℃)
- Cable :
  - Insulation thickness : Min. 0.6 mm / 0.024 in.
  - Molding jacket diameter : Min 6.6 mm / 0.260 in.



Twisted Pair Cable : 1-pair

- Conductor :
  - Size : Min. 0.5 mm² (AWG 20 or lager)
- Cable :
  - Insulation material : Polyethylene
  - Insulation thickness : Min. 0.5 mm / 0.020 in.
  - Jacket diameter : Min. 1.5 mm / 0.059 in.

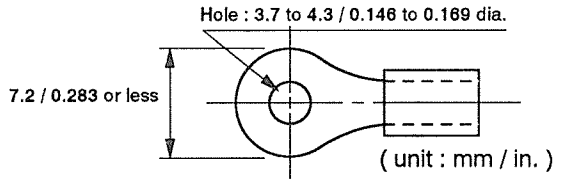


Crimp Terminal

Be sure to connect the cables and the interface terminals correctly using crimp terminals.

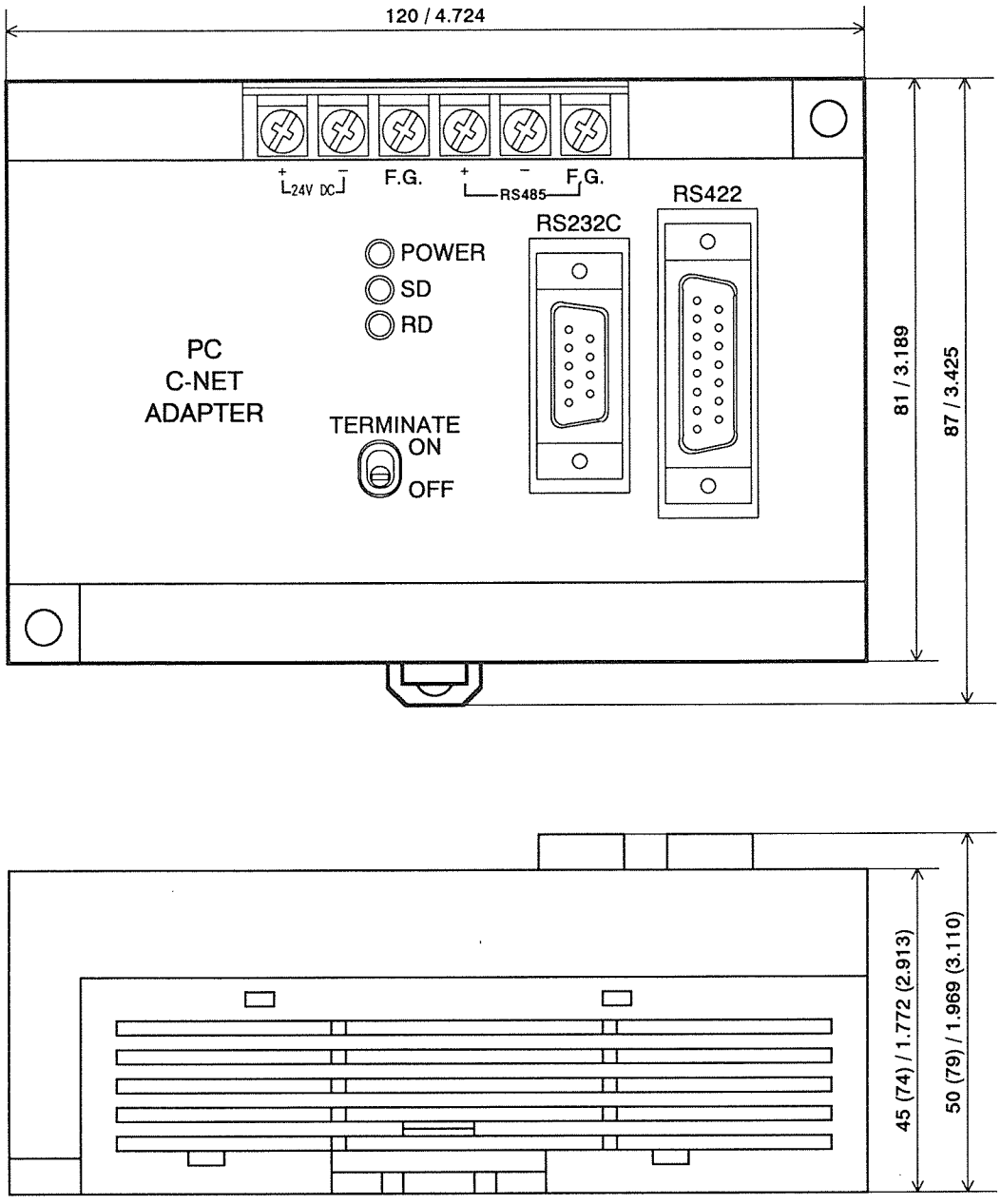
Suitable crimp terminals :

- Ring terminal
- Insulated ring terminal
- Fork terminal



3-3. Dimensions

The number in ( ) indicates the dimensions for the AC type.



(unit : mm / in.)

CHAPTER 4

INSTALLATION

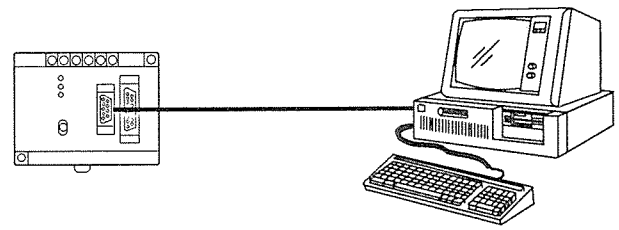
"PC" is an abbreviation of Programmable Controller.

4-1. Outline

1. Procedure

① Before beginning

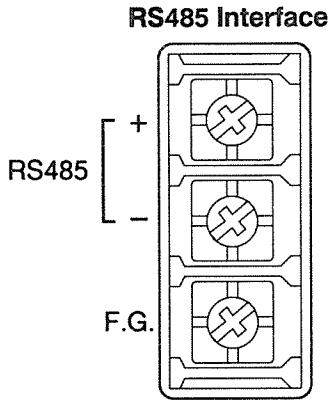
Connect your computer's RS232C serial port to the C-NET Adapter.
Then, set the baud rate, character bit, parity check, parity bit, and stop bit at computer side.



C-NET Adapter　　Computer

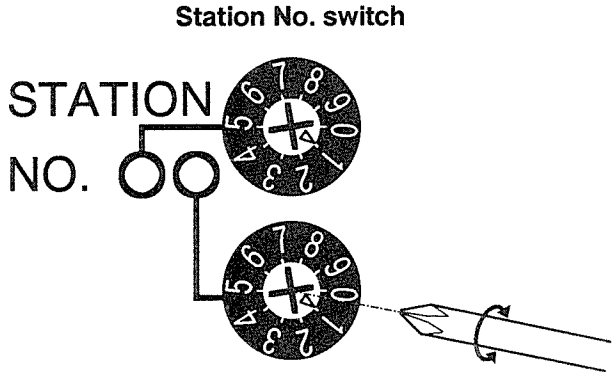
② Connection

Connect one of the C-NET Link Units to the C-NET Adapter with 2-conductor cable.



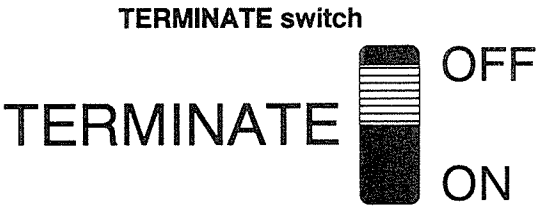
③ Setting Station Number

Set a different station number for each C-NET Link Unit or FP1 connected to a C-NET Adapter. The station number range is from 01 to 32.



④ Configuring the Terminal Stations

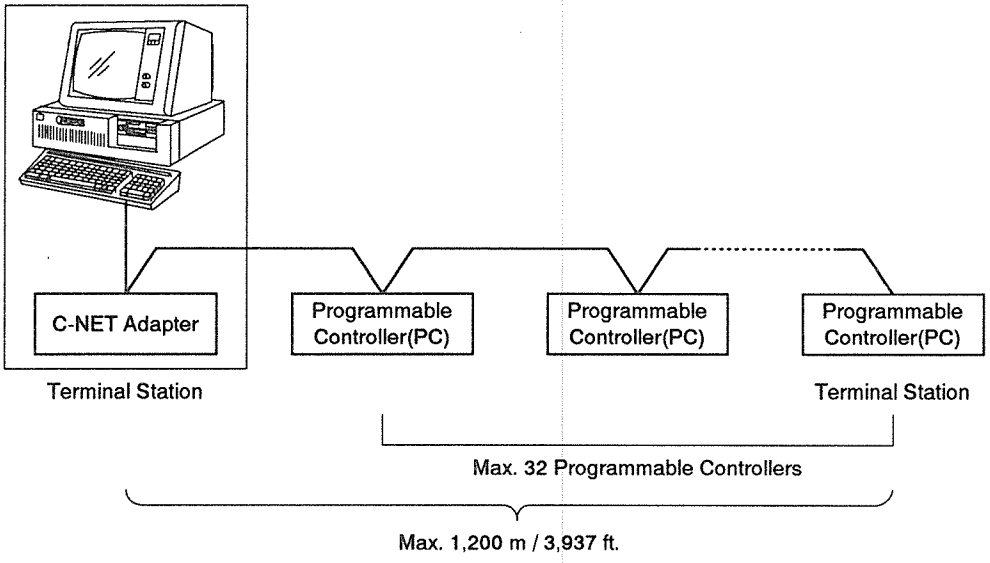
Configure the two C-NET Link Units or C-NET Adapters which are located each end of the C-NET as terminal stations. Set the 'TERMINATE' switch on the front panel to the ON position.



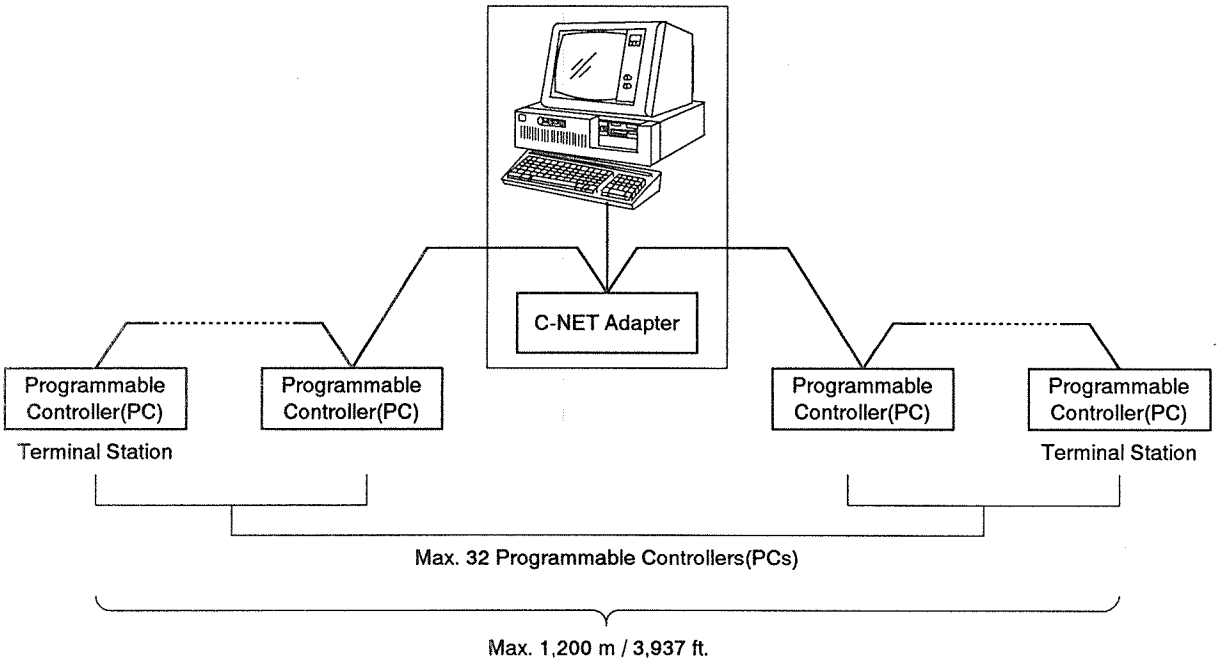
2. Equipment Configurations

There are two configurations for the C-NET Link System, as shown below.

① Terminal Stations : A Computer & A Programmable Controller (PC)



② Terminal Stations: Programmable Controllers (PCs)

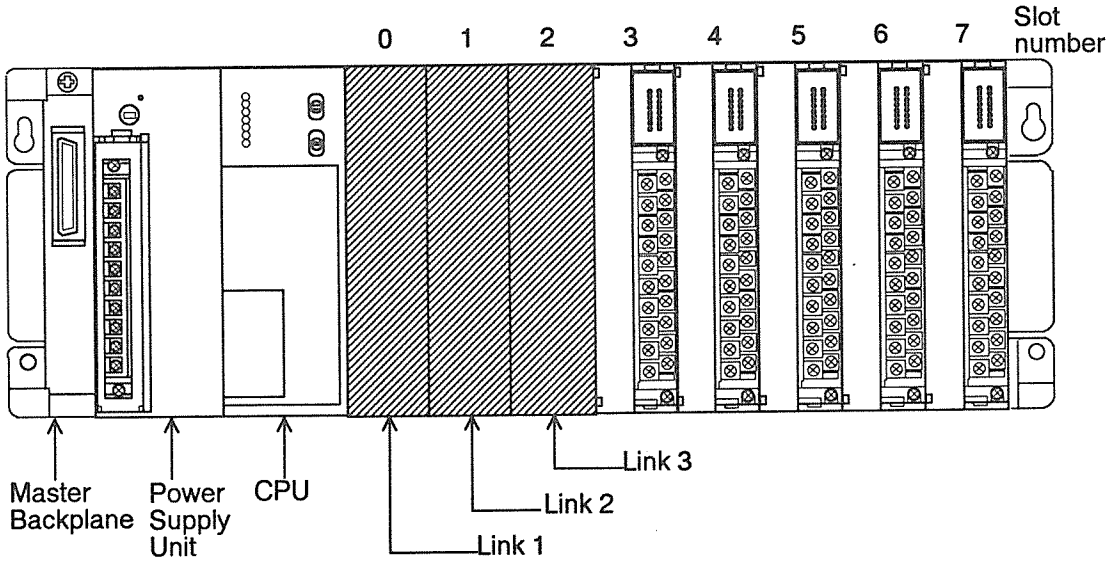


4-2. Installing a C-NET Link Unit

1. Location

The C-NET Link Unit should be installed on a Master Backplane.

The C-NET Link Unit is handled in the same manner as the C.C.U.(Computer Communication Unit) and the Link Unit.
Up to 3 units, including a C.C.U. and a Link Unit can be installed for each CPU.
These units are designated LINK1, LINK2 and LINK3 starting with the unit closest to the CPU.
For example one C-NET Link Unit and two other network units can be installed.



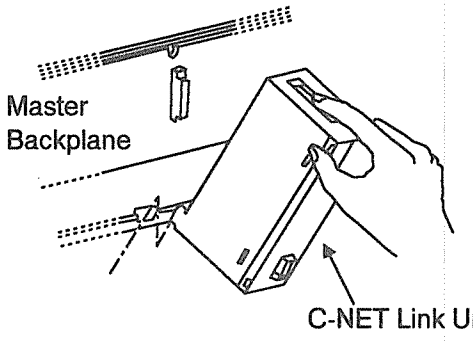
Notes :

- The C-NET Link Unit cannot be installed on :
  - Expansion Backplane
  - Slave stations of the Remote I/O System
- Up to 3 units, including C.C.U. and Link Unit, can be installed on one CPU.
- 16 points (16SE) are automatically allocated for the C-NET Link Unit.
  Using the NPST-GR ("SET I/O MAP" function), the occupied points can be set to 0 point (0SE).
  This function will help you when more actual I/O points are needed.
- When two or more link units are installed for one CPU, be sure to check that the CPU dose not handle two or more processing at a time.

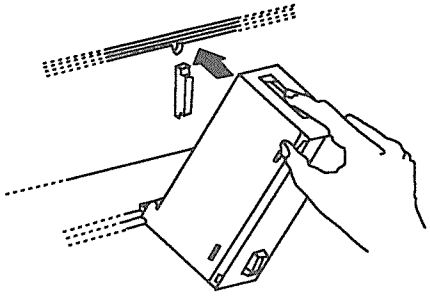
2. How to install a C-NET Link Unit

Before installing the unit, remove the connector cover on the Master Backplane.

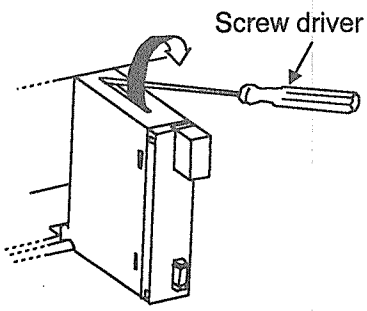
1. Fit both flanges on the unit into the holes in the Master Backplane.



2. Push the unit in the direction of the arrow to install it in the Master Backplane.



3. After properly installing the unit, tighten the screw at the top.



Notes :

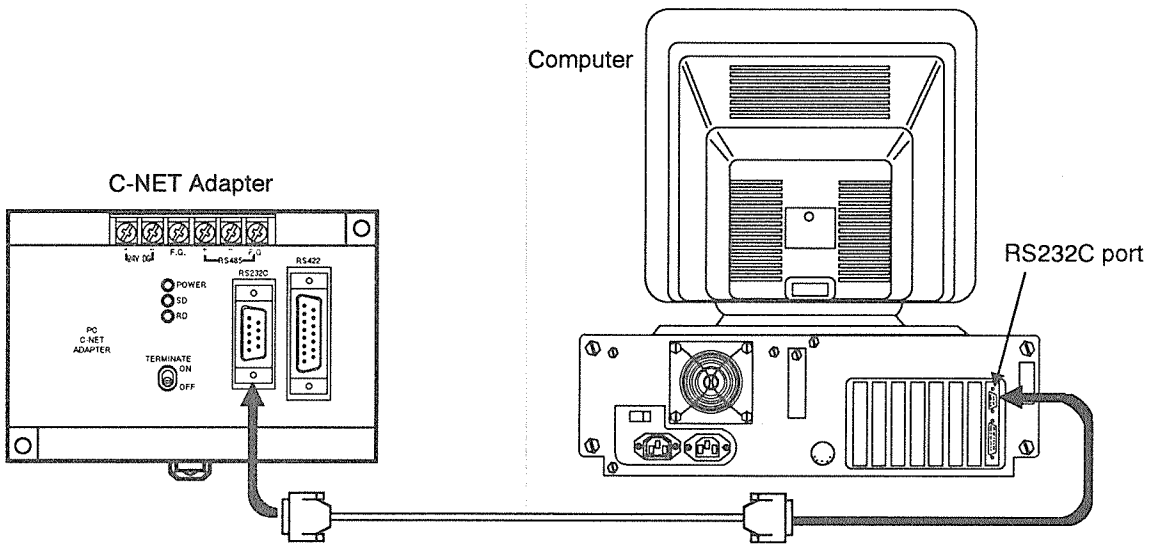
- Be sure to remove or install the C-NET Link Unit only when all of the power is OFF.
- Be careful not to use unreasonable force when pushing the connector on the C-NET Link Unit into the connector in the Master Backplane.

3. Cautions

- The C-NET Link Unit cannot be installed on :
  - Expansion Backplane
  - Slave stations in a Remote I/O System
- Up to 3 network link units, including the C-NET Link Unit, the C.C.U.(Computer Communication Unit)) and the Link Unit, can be installed on one CPU.
- Install or remove the C-NET Link Unit with all of the power turned OFF.
- Be sure to install the C-NET Link Unit securely in the Master Backplane.
- Do not touch the connectors on rear side. This may damage the C-NET Link Unit because of static electricity.
- Do not drop the C-NET Link Unit or apply excessive force to the unit.
- Do not allow pieces or other objects to fall into the unit when making wiring connections.
- The system should only be used within the specified ratings.
  - Operate the system at ambient temperatures of 0 ℃ to 55 ℃ / 32 ℉ to 131 ℉ .
  - Operate the system at an ambient humidity of 35% to 85% RH.
- The system should be used in a place where it will not be exposed to :
  - Sudden temperature change causing condensation.
  - Inflammable or corrosive gas.
  - Excessive airbone dust or metal particles.
  - Benzyne, paint thinner, alcohol or other organic solvents, strong alkaline solutions, or ammonia or caustic soda.
  - Excessive vibration or shock.
  - Influence from power transmission lines, high voltage equipment, power cables, power equipment, radio transmitters, or any other equipment that would generate high switching surges.
  - Water in any form including spray or mist.
  - Direct sunlight.

4-3. Connecting a Computer and a C-NET Adapter

The computer is linked with the C-NET Link Unit through a C-NET Adapter. Connect the RS232C port of your computer to that of the C-NET Adapter.



Requirements :

Computer : Commercially available computer (Example: IBM PC-AT or 100% compatible)
C-NET Adapter : AC operating type...AFP8536
DC operating type...AFP8532
RS232C cable : Max. 15 m / 49.2 ft.

■ RS232C Cable Example

AFB85833

Connected to C-NET Adapter (9 Pins Male)		Connected to computer (25 Pins Female)	
Pin No.	Abbrev.	Pin No.	Abbrev.
1	FG	1	FG
2	SD(TXD)	2	SD(TXD)
3	RD(RXD)	3	RD(RXD)
4	RS(RTS)	4	RS(RTS)
5	CS(CTS)	5	CS(CTS)
6	RI(CI)	6	DR(DSR)
7	SG	7	SG
8	CD(DCD)	8	CD(DCD)
9	ER(DTR)	20	ER(DTR)

AFB85853

Connected to C-NET Adapter (9 Pins Male)		Connected to IBM PC-AT (9 Pins Female)	
Pin No.	Abbrev.	Pin No.	Abbrev.
1	FG	1	CD(DCD)
2	SD(TXD)	2	RD(RXD)
3	RD(RXD)	3	SD(TXD)
4	RS(RTS)	4	ER(DTR)
5	CS(CTS)	5	SG
6	RI(CI)	6	DR(DCD)
7	SG	7	RS(RTS)
8	CD(DCD)	8	CS(CTS)
9	ER(DTR)	9	RI(CI)

Notes :

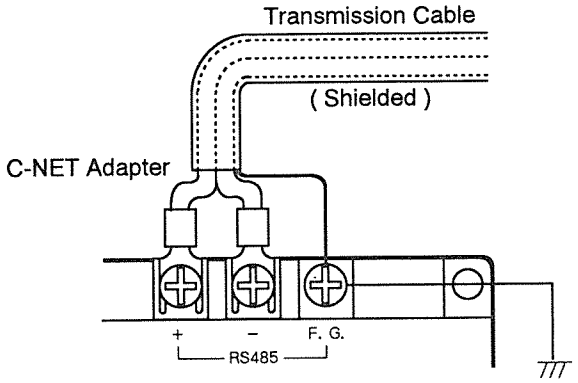
- Be sure to turn OFF the power to your computer and the C-NET Adapter when connecting them.
- Check, the RS232C specifications of your computer before connecting it to the C-NET Adapter.
- Use an RS232C cable with a maximum length of 15 m / 49.2 ft. or less.

4-4. Connecting a C-NET Link Unit and a C-NET Adapter

Connect the RS485 interfaces on the C-NET Link Units or the C-NET Adapters with two-conductor cables. You can increase the communication distance up to 1,200 m / 3,937 ft. by using the RS485 interface.

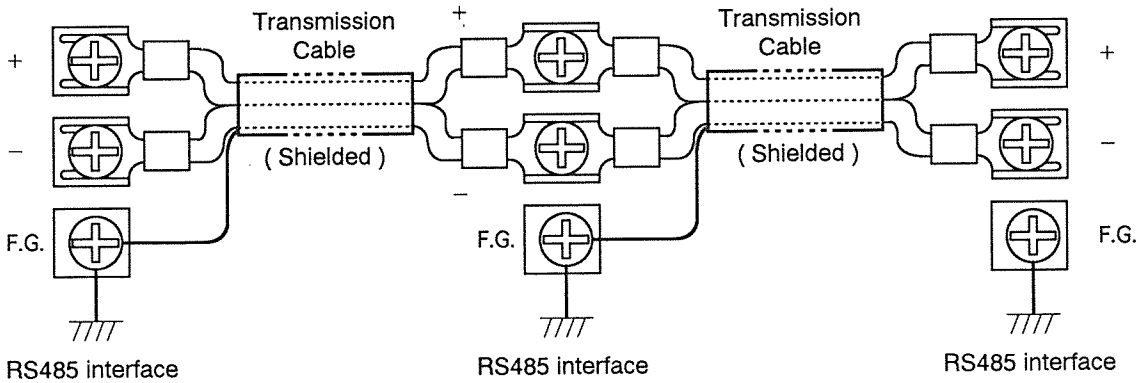
1. C-NET Adapter Side

Connect one end of a transmission cable (shielded twiseted pair or 2-conductor cable) to the RS485 interface on the C-NET Link Unit.



2. C-NET Link Unit Side

- Connect positive (+) to positive and negative (-) to negative using a shielded twisted pair or two-conductor cable.
- Connect one end of the shielded wire to the frame ground terminal, then ground the F. G. terminal to an earth ground.



Notes :

- Regarding the transmission cables refer to page 10 or 17 "3. Cable Specifications" for further information.
- Total length of the transmission cable should be 1,200 m / 3,937 ft. or less.
- Connect the C-NET Link Units and the C-NET Adapter with all power OFF.
- Do not connect both ends of the shielded wire to frame ground. There may be a difference in the absolute voltage level between the "ground" at one unit and the "ground" at the next unit several hundred meters away. In this case, current would flow between the two "grounds" and could damage the equivalent or interface with communications.

CHAPTER 5

SETTING

"PC" is an abbreviation of Programmable Controller.

5-1. Computer Settings

1. Communication Settings

To enables communications between the computer and C-NET Link Units, the communication parameter should be set before running a program.

Setting

Baud rate : 9,600 bps
Character bits : 7-bit / 8-bit
Parity check : Invalid / Valid (Even or Odd)
Stop bits : 1-bit / 2-bit

Notes :

- All the settings for the computer and the Programmable Controllers(PCs) should be the same.
- The total number of bits used to send a character of information should add up to 10 bits. Since the start bit is fixed at 1 bit, you may select any of the following 3 combinations.

Start bit		Character bits		Parity bit		Stop bits	
1	+	7	+	1	+	1	= 10 bits
1	+	7	+	0	+	2	= 10 bits
1	+	8	+	0	+	1	= 10 bits

Sample Program for communication settings

```
10 OPEN " COM1 : 9600, 0, 7, 1 " AS #1
```

RS232C port1 — 9,600 bps — Odd parity — 7-bit — Stop bit — File No.1

Note :

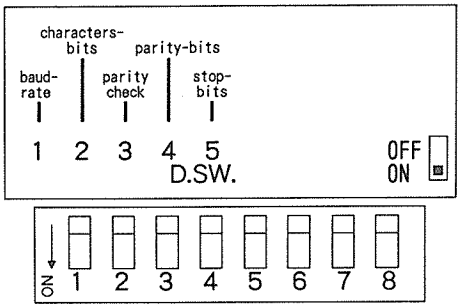
- Since the sample program line above is only for reference program, be sure to check BASIC manual of your own computer.

5-2. C-NET Link Unit Settings

1. Communication Settings

The communication setting for the C-NET Link Unit are changed with the Mode Selector Switches (DIP switches) on its rear panel.

• Specifications for the Mode Selector Switches



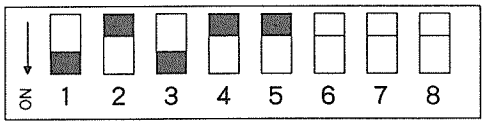
Switch Number	Specifications		Switch position							
			1	2	3	4	5	6	7	8
1	Baud rate	19,200 bps	OFF					–		
		9,600 bps	ON					–		
2	Character bit	7-bits		OFF				–		
		8-bits		ON				–		
3	Parity check	Invalid			OFF			–		
		Valid			ON			–		
4	Parity bit	Odd parity				OFF		–		
		Even parity				ON		–		
5	Stop bit	1-bit					OFF	–		
		2-bit					ON	–		

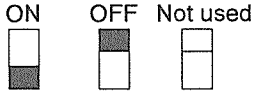
Notes :

- All the settings for the computer and the C-NET Link Unit should be the same.
- The total number of bits used to send a character of information should add up to 10-bits. Since the start bit is fixed at 1 bit, you may select any of the following 3 combinations.

Start bit		Character bits		Parity bit		Stop bits	
1	+	7	+	1	+	1	= 10 bits
1	+	7	+	0	+	2	= 10 bits
1	+	8	+	0	+	1	= 10 bits

• Setting example

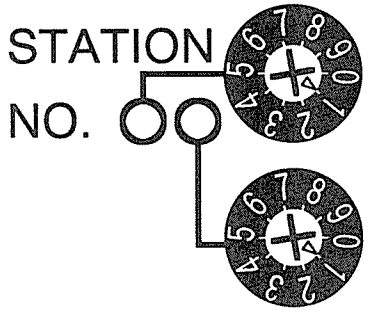




Baud rate : 9,600 bps
Character bit : 7-bit
Parity check : Odd
Stop bit : 1-bit

2. Station Number Settings

Maximum of 32 Programmable Controllers (FP1 or FP3) can be connected to one computer.
Each station (Programmable Controller) should have its own number so that it is independent of the other units.



Example (Station number 11)

Upper digit 1

Lower digit 1

Notes :

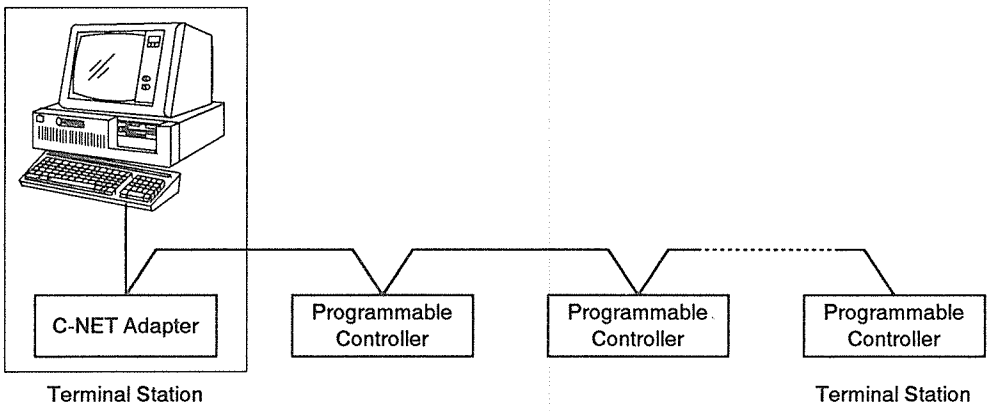
- The station numbers should be set within the range of 01 to 32 (numbers 00 and 33 to 99 : invalid).
- The same station number cannot be used for more than one station. If a station number is assigned to more than one unit or if an invalid station number is assigned, the ERROR LED flashes.
- The station number can be set independently of its position in the link.
- There is no limitation regarding unused station numbers. That is, you may skip certain number if you wish.

5-3. Terminal Station Settings

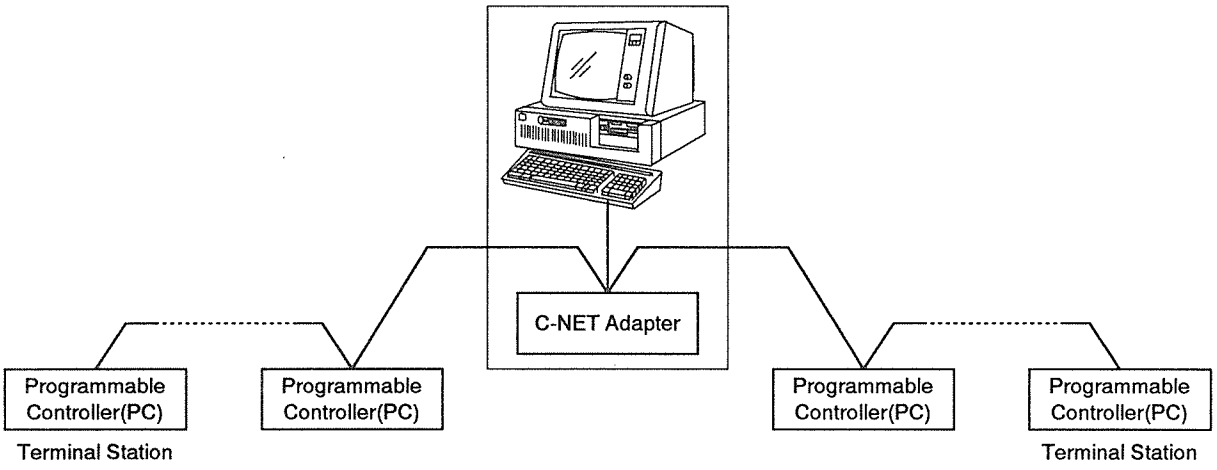
In order to prevent transmission errors, be sure to set the TERMINATE switches of the C-NET Link Units or the C-NET Adapters properly.

• Terminal station : Configure the two C-NET Link Units or C-NET Adapters which are located each end of the C-NET as terminal stations.

① A Computer & A Programmable Controller (PC) as terminal stations

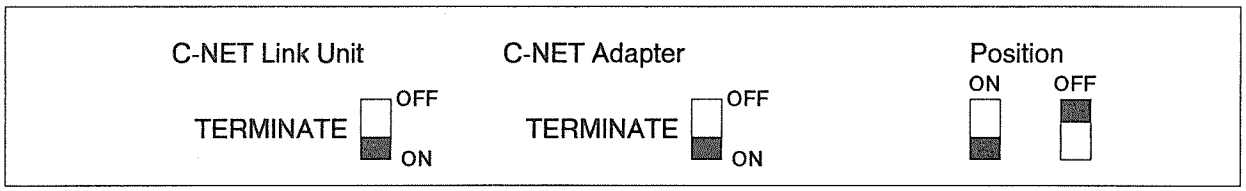


② Two Programmable Controllers (PCs) as terminal stations



• Terminal station designation

- Terminal station : Turn ON the TERMINATE switch of the C-NET Link Unit or the C-NET Adapter to designate the unit as a teriminal station.
- The other station : Turn OFF the TERMINATE switch of the C-NET Link Unit or the C-NET Adapter for all other stations.



CHAPTER 6

COMMANDS

"PC" is an abbreviation of Programmable Controller.

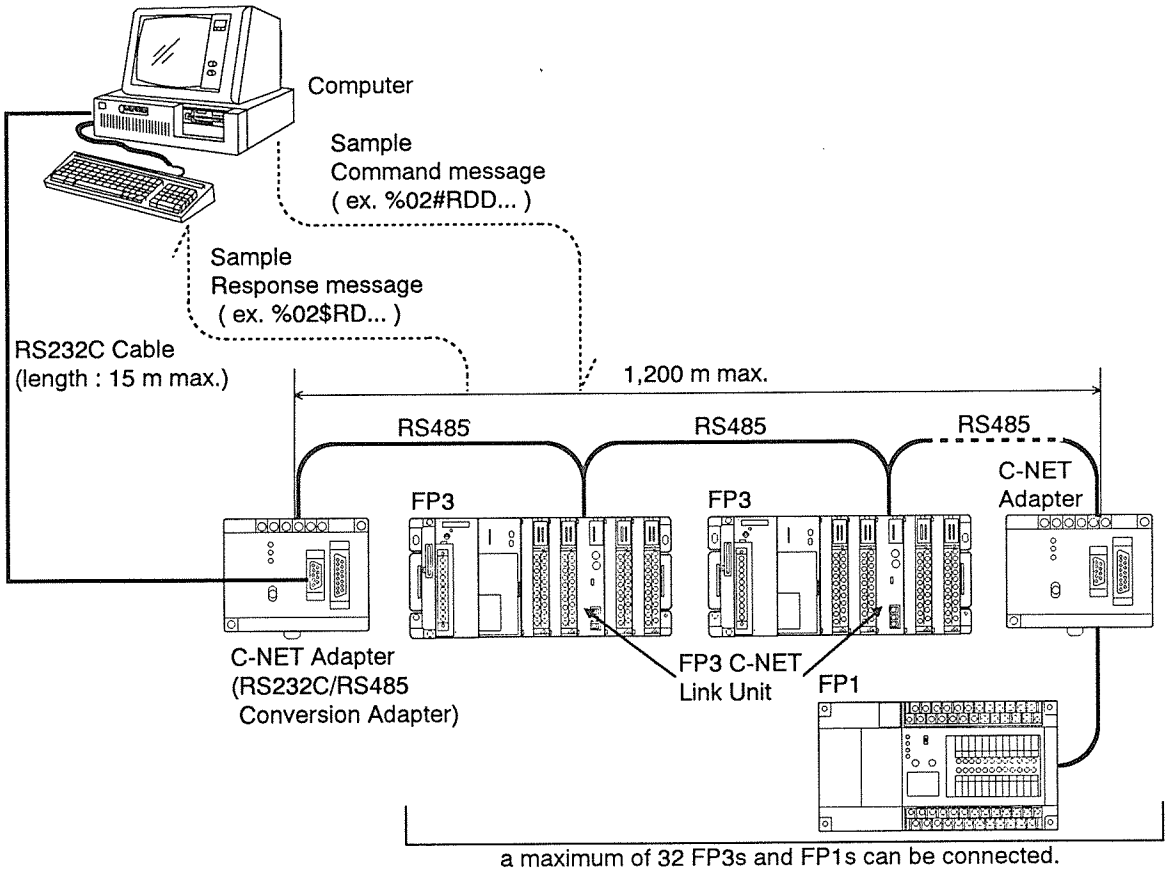
6-1. Computer Link Function

• Computer Link Function [Between a computer and a programmable controller]

The FP3 can communicate with a computer via an FP3 C-NET Link Unit installed in the FP3 system. In this type of link, the computer is the host, and can control a maximum of 32 FP3s. The muximum distance between the computer and an FP3 is 1,200mr/3,937ft. Because the FP3 C-NET Link Unit has an RS485 port and computers use an RS232C port, you must use a C-NET Adapter(RS232C-RS485/RS485-RS232C), at the computer station to connect the FP3 to the computer for data communication on the C-NET link.

• NEWTOCOL-COM (Half-duplex communication protocol)

In the Computer Link, communication is performed using MEWTOCOL-COM, the half-duplex communication protocol for the FP Series of programmable controllers. From the computer, you can read, write or monitor data stored in the memory of the programmable controller, such as contact data and timer values. Create communication programs so that they accommodate the format of MEWTOCOL-COM. You can use any program language such as BASIC or C to write the computer programs. The details of MEWTOCOL-COM are explained in the following sections.



● Memory Configurations of the FP3

The memory area of the FP3 Programmable Controller(PC) that you can read/write/monitor from a computer are as follows:

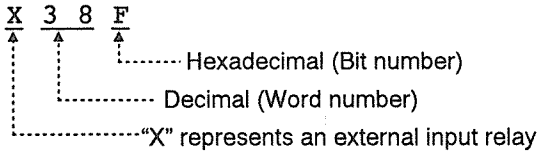
1. Operand

Type	Name of memory area	Available number of points /words	Numbering system
Relays	External input relay (X)	2,048 points (X0 to X127F) 128 words (WX0 to WX127)	Relay bit numbering system Word numbering system
	External output relay (Y)	2,048 points (Y0 to Y127F) 128 words (WY0 to WY127)	Relay bit numbering system Word numbering system
	Internal relay (R)	1,568 points (R0 to R97F) 98 words (WR0 to WR97)	Relay bit numbering system Word numbering system
	Link relay (L)	2,048 points (L0 to L127F) 128 words (WL0 to WL127)	Relay bit numbering system Word numbering system
Registers	Data register (DT)	2,048 words (DT0 to DT2,047)	Word numbering system
	File register (FL)	8,189 words (FL0 TO FL8,188)	Word numbering system
	Link data register (LD)	256 words (LD0 TO LD255)	Word numbering system
	Index register (IX/IY)	2 words (IX & IY)	IX or IY (No numbering system)
Timers/ Counters	Timer/counter contact (T/C)	256 points (0 to 255)	Decimal numnbering
	Timer/counter Set(Preset) value (SV)	256 words (SV0 to SV255)	Word numbering system
	Timer/counter Elapse(Count) value (EV)	256 words (EV0 to EV255)	Word numbering system

Note :

Explanation of basic terminology

- Bit
  One binary digit. The smallest unit of binary information.
  A bit can express a value of "1" or "0".
- Word
  A word is composed of 16 bits which are operated on simultaneously when a computer is performing an instruction. Word addresses are expressed as decimal numbers.
- Relay bit address
  Addresses for relay bits(X, Y, R and L) are expressed as a combination of a word address(decimal) and hexadecimal number designating a specific biit. The rightmost digit is hexadecimal and the rest of the digits are decimal.
  Example: X38F



2. Other memory areas
   System register : Memory area for system settings used by the Programmable Conttoller (PC).
   Program area: Memory area where the program is stored.

6-2. Basic Format of MEWTOCOL-COM

The initiative for communication is taken by the computer. When a command is sent to a Programmable Controller(PC), the response is sent back to the computer in turn using the specified format.

All the messages are transmitted as ASCII codes. Therefore, all characters you send to or receive from a Programmable Controller(PC) should be converted to the ASCII HEX code. Regarding ASCII HEX code, refer to page xx "ASCII Codes".

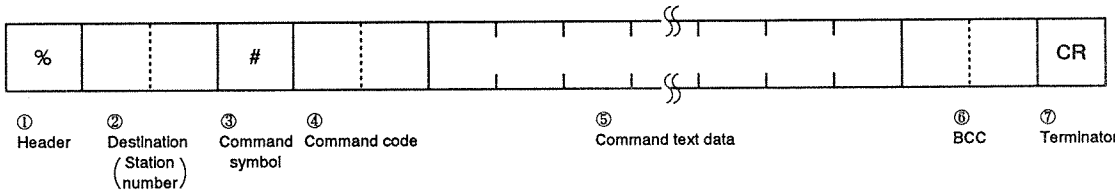
Notes :

- Basic terminology of MEWTOCOL-COM

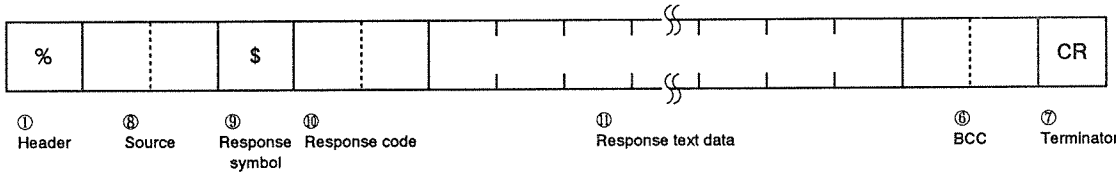
Message	:A series of characters combining commands and text which are sent in one or more frames.
Command message	:A message from the computer to the Programmable Controller(PC).
Response message	:A message from the Programmable Controller(PC) to the computer.
Frame	:A group of not more than 118 characters which always includes a header "%", a station number(source or destination), a text block, a block check code, and a terminator.

1. Basic Message Format

■ Command message format

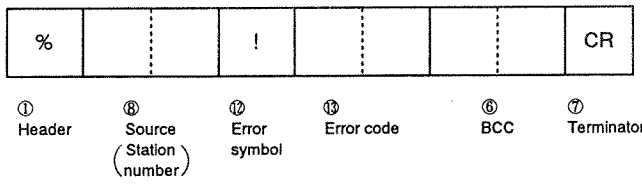


■ Response message format



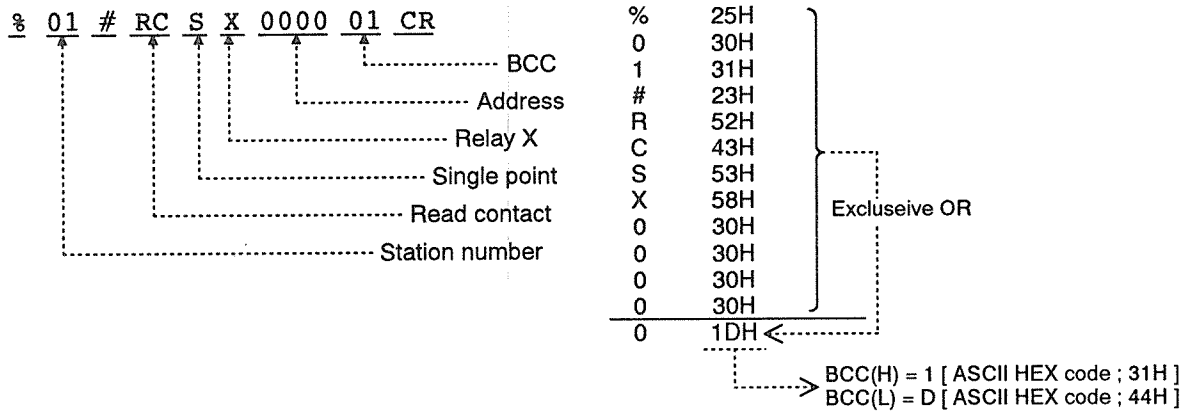
■ Error response message

When an error occurrs during data transmission, the following response will be returned by a Programmable Controller(PC).



① Header ["%" (ASCII code: 25H)]
The percent character "%" is used for the header in both command and response messages.
② Destination (Station number) ["01" through "32"(decimals) or "FF"]
The station that should read the command message is specified as 2 characters representing a decimal station number. Accordingly, the station number must be specified in the range of "01" to "32".
You also can specify it as "FF" to send a command message to all of the stations. In this case, no response message will be returned.
③ Command symbol ["#" (ASCII code: 23H)]
The pound sign "#" is used for the command symbol.
④ Command code [2 characters (capital letters)]
The command code is specified as 2 uppercase characters. For details of the command codes, refer to page 41, "List of Command/Response Codes".
⑤ Command text data
Depending on the command, the content of text data will vary.
Information such as memory address that subjected to the data transmission, and data (if any), will be specified here.
⑥ Block Check Code (BCC) [2 characters]
This code is used to detect errors in the message transmissions.
If "**" is sent from a computer as the BCC, no block check will be performed on the command message. Even if a computer sending a command message has specified that no BCC is being sent, the receiving station will insert its own BCC in the response message.
It is created by Exclusive ORing all of the codes from the header through the last text character, then translating the resulting 8-bit data into two ASCII characters.

Example :



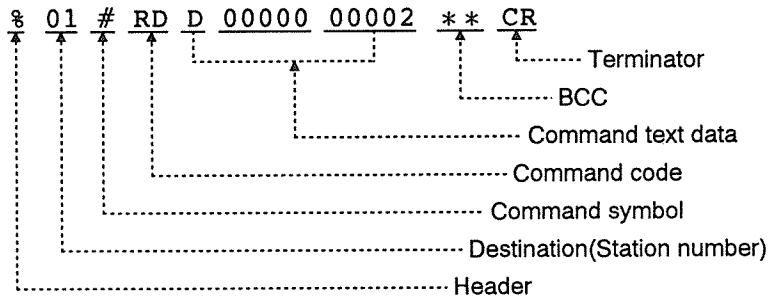
⑦ Terminator [CR(ASCII code: 0DH)]
The carriage return "CR" is used as the terminator in both command and response messages.
⑧ Source (Station number) ["01" through "32" (decimals) or "FF"]
The station number specified in the command message as the destination will be returned as the source station number.
⑨ Response symbol ["$"(ASCII code: 24H)]
The dollar sign "$" is used in the response message. This indicates that a data transmission has was successfully received.
⑩ Response code [2 characters (capital letters)]
The same code as the one sent in the command message will be returned to indicate the Programmable Controller(PC) is responding to the command message.
⑪ Response text data
When data must be returned in the response message, the response text data is added after the response code.
For example, when a register read command(RD) is sent from a computer, the Programmable Controller(PC) will respond with text data.
⑫ Error symbol ["!"(ASCII code: 26H)]
The exclamation character "!" is used to identify an error message. This indicates that a data transmission error occurred.
⑬ Error code [2 characters (hexadecimals)]
The error code is specified as a 2-character hexadecimal number in ASCII format.
For details about MEWTOCOL-COM error codes, refer to page 46 "6. List of Error Codes".

Example

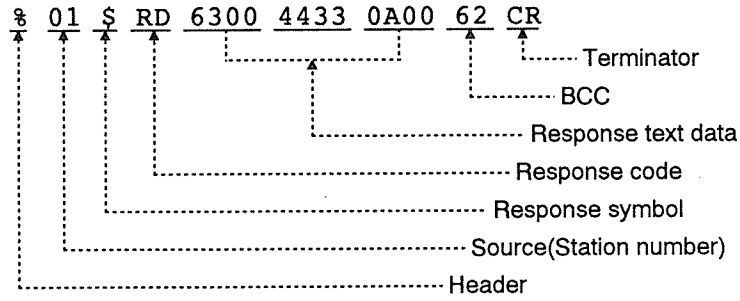
Reading data from data registers, DT0000 through DT0002 in a Programmable Controller(PC) which has assigned number 01.

The data in the data registers are ; DT0000 0063(Hexadecimal)
DT0001 3344(Hexadecimal)
DT0002 000A(Hexadecimal)

Command message



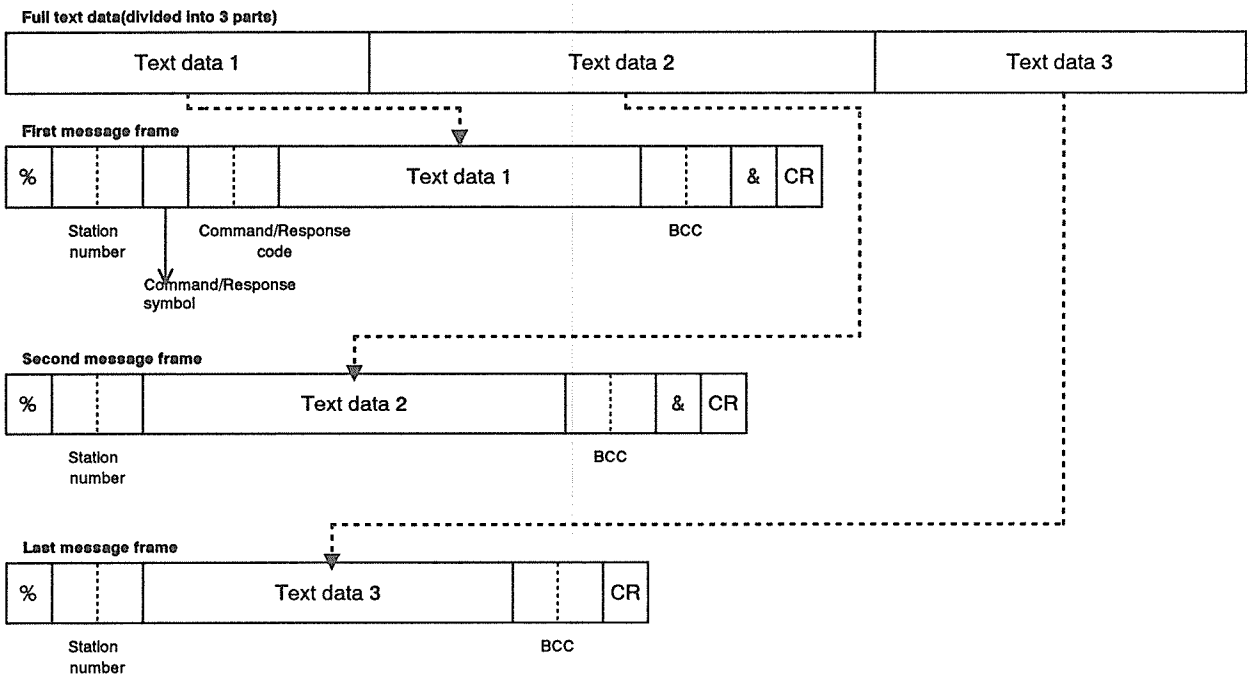
Response message



2 Multiple Frames

The maximum message length that the FP3 C-NET Link Unit can receive or send at one time is 118 characters. If the message to be sent exceeds 118 characters, it must be divided into separate frames as shown below.

How to divide a message into multiple frames



The characters included in each frame are slightly different.

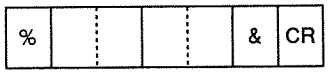
•1st frame
The delimiter character "&" is added after the BCC.
In all other respects it is just like a single frame message.

•2nd(and 3rd, etc.) frames
The second, third, etc. frames do not use the command or response symbols ("#", "$"), but the second frame does require the "&" character between the BCC and the terminator(CR).

•Last frame
The last frame does not use the command or response symbols("#", "$")
It also does not include the "&" delimiter character. In other words, it is just like a regular message frame, without a command or response symbol.

Data request message frame

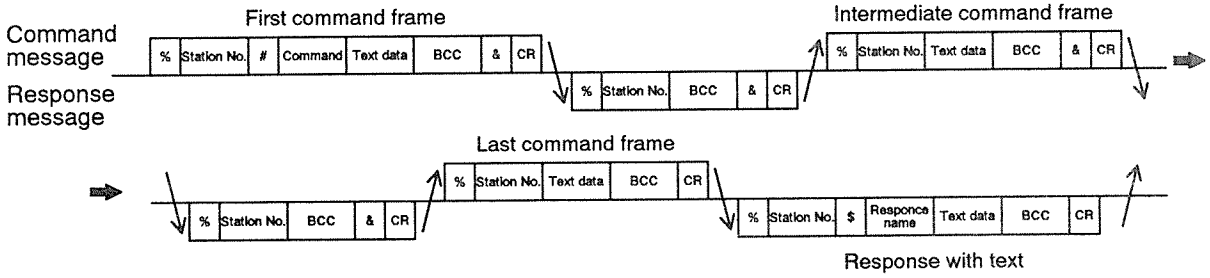
When a Programmable Controller(PC) or a computer receives a message that contains an "&" delimiter, they must send a data request message that contains the station number, the BCC and an "&". For details, refer to the next sections.



Data flow using multiple frame

Using multiple frame command message

After each frame of the command message that contains an "&" delimiter is received, the Programmable Controller(PC) responds with its station number and the BCC. Then the Programmable Controller(PC) waits for the next piece of the command message.

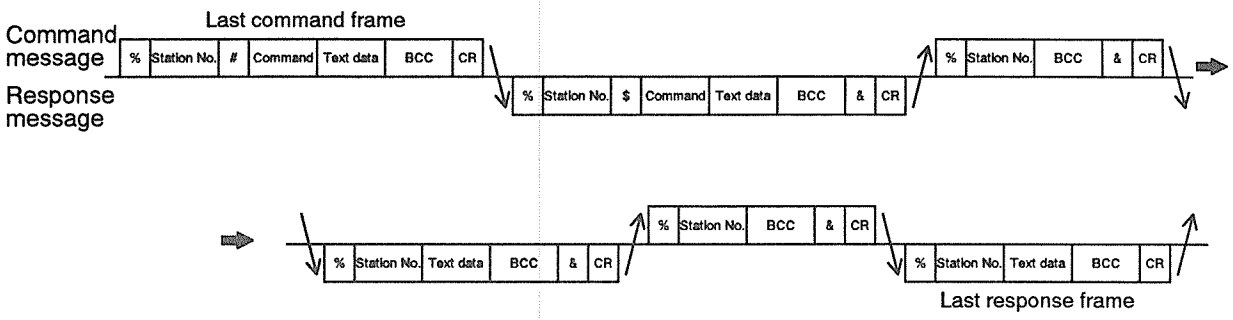


Note :

- The response message frame parentheses with text("$" response symbol/response code/text data) are not sent back to the computer until all of the command message frames with text have been sent to the Programmable Controller(PC).

Using a multiple frame response message

After receiving each frame of a response message that contains an "&" delimiter, the computer responds with the station number and the BCC. Then the computer waits for the next piece of the response message.



Note :

- Command message frames without text(station number/BCC) are sent back to the Programmable Controller(PC) until all the response message frames have been received by the computer.

Notes :

- When a message is divided into multiple frames, the next frame cannot be sent without first receiving a confirmation that the most recent frame was received correctly.
- As a message in multiple frames cannot be interrupted without using the abort(AB) command, it is recommended that the number of frames in one message should be limited to as small a number as possible.

3. List of Main Symbols

Symbol name	Character	ASCII code (Hexadecimal)	Description
Header	%	25	Indicates the start of a message frame.
Command symbol	#	23	Indicates a command message.
Response symbol	$	24	Indicates a normal response message frame.
Error symbol	!	21	Indicates a response message when an error has occurred.
Terminator	CR	0D	Indicates the end of a message frame.
Delimiter	&	26	Indicates more to follow when a message is sent as several frames.

4. List of Memory Area Codes in MEWTOCOL-COM

The memory area codes are specified as 1 or 2 characters(capital letters).

These codes are a little bit different from the names used in the Programmable Controller(PC) for the memory area in numbering or their specifications. Be sure to check the coincidence of each code before use.

Memory Area Name	Memory Area Code (ASCII HEX code)	Descriptions	Applicable commands
External input relay	X (58)	•This code is used when the external input relays in the memory area are specified. •In the "RC" command, this code is used also to specify the word units address of the memory.	RC MC WC ※ SC ※
	WX (57)(58)	•Tis code is used only when the word external input relays are specified in the "MD" command. In other commands, the code "X" is used to specify also word external input relays.	MD
External output relay	Y (59)	•This code is used when the external output relays in the memory area are specified. •In the "RC", "WC" and "SC" commands, this code is used also to specify the word units address of the memory.	RC WC SC MC
	WY (57)(59)	•This code is used only when the word external output relays are specified in the "MD" command. In other commands, the code "Y" is used to specify also word external output relays.	MD
Internal relay	R (52)	•This code is used when the internal relays in the memory area are specified. •In the "RC", "WC" and "SC" commands, this code is used also to specify the word units address of the memory.	RC WC SC MC
	WR (57)(52)	•This code is used only when the word internal relays are specified in the "MD" command. In other commands, the code "R" is used to specify also word internal relays.	MD
Link relay	L (4C)	•This code is used when the link relays in the memory area are specified. In the "RC", "WC" and "SC" commands, this code is used also to specify the word units address of the memory.	RC,WC SC,MC
	WL (57)(4C)	•This code is used only when the word link relays are specified in the "MD" command. In other commands, the code "L" is used to specify also word internal relays.	MD
Data register	D (44)	•This code is used when the data registers in the memory area are specified. Its addresses are expressed as a decimal number	RS,WD, SD,MD
File register	F (46)	•This code is used when the file registers in the memory area are specified. Its addresses are expressed as a decimal number.	RS,WD, SD,MD
Link data register	L (4C)	•This code is used when the link data registers in the memory area are specified. Its addresses are expressed as a decimal number.	RS,WD, SD,MD

Index register (IX/IY)	IX (49)(58)	•This code is used when the index register IX in the memory area are specified. As each Programmable Controller(PC) has only one IX index register, the imaginary address of "0000" or "00000" is specified in the command message.	RD WD MD
	IY (49)(59)	•This code is used when the index register IY in the memory area are specified. As each Programmable Controller(PC) has only one IY index register, the imaginary address of "0000" or "00000" is specified in the command message.	RD WD MD
	ID (49)(44)	•This code is used when both X type and Y type index registers in the memory area are specified. As each Programmable Controller(PC) has only one set of index registers(IX and IY), the imaginary address of "0000" or "00000" is specified in the command message.	RD WD
Timer/Counter contact	T (54)	•This code is used when the timer contacts in the memory area are specified. As they are expressed in decimal number, be sure to check its contact address when the address should be specified in word units. •Even if you specify "T" in the counter contact area address number, no error will occur.	RC WC MC
	C (43)	•This code is used when the counter contacts in the memory area are specified. As they are expressed in decimal number, be sure to check its contact address when the address should be specified in word units. •Even if you specify "C" in the counter contact area address number, no error will occur.	RC WC MC
Timer/Counter Set(Preset) value area	S (53)	•This code is used when the timer and/or counter set(preset) value areas in the memory area are specified in the "MD" command.	MD
Timer/Counter Elapsed (Counter) value area	K (4B)	•This code is used when the timer and/or counter set(preset) value areas in the memory area are specified in the "MD" command.	MD

Note :

- The commands with the ※ mark are available only for the FP3.

5. List of Command/Response Codes

The command/response codes are specified as 2 characters(capital letters).

The same code as the one sent in the command message will returned to indicate that the Programmable Controller(PC) is responding to the command message.

Command/ Response code (ASCII HEX code)	Functions	Available memory area	Memory area code in MEWTOCOL-COM
Relay Basic Commands			
RC (52)(43)	Reads the contents stored in external input relays, external output relays, internal relays, link relays and timer or counter contacts. A computer can read a single bit of data, or an optional number of bits(1 to 8 bits) in one command message. It can also read data in units of words(one word=16 bits).	External input relay External output relay Internal relay Timer contact Counter contact Link relay	X Y R T C L
WC (57)(43)	Writes data into external output relays, internal relays, link relays and timer or counter contacts. A computer can write a single bit of data, or an optional number of bits data (1 to 8 bits) in one command message. It can also write data in units of words(one word=16 bits).	External output relay Internal relay Timer contact Counter contact Link relay	Y R T C L X ※
SC (53)(43)	Set a data pattern in external output relays, internal relays or link relays. The data pattern is written in units of words(one word=16 bits).	External output relay Internal relay Link relay	Y R L X ※
Register Basic Commands			
RD (52)(44)	Reads the contents stored in data registers, link data registers, file registers or index registers(IX or/and IY). As the memory area is configured as 16 bits, a piece of data will be returned as a 4-digit hexadecimal number(in ASCII format).	Data register Link data register File register Index register IX Index register IY Index register IX & IY	D L F IX IY ID
WD (57)(44)	Writes data into data registers, link data registers, file registers or index registers(IX or/and IY). As the memory area is configured as 16 bits, the data to be written into is specified as a 4-digit hexadecimal number(in ASCII format).	Data register Link data register File register Index register IX Index register IY Index register IX & IY	D L F IX IY ID
SD (53)(44)	Sets a data pattern in data registers, link data registers or file registers. As the memory area is configured as 16 bits, the data is specified as a 4-digit hexadecimal number(in ASCII format).	Data register Link data register File register	D L F
Timer/Counter Set(Preset)/Elapsed(Count) Value Commands			
RS (52)(53)	Reads the Timer/Counter Set(Preset) Value stored in the Set(Preset) Value area.	Set(Preset) Value area	No need to specify the memory area code.
WS (57)(53)	Writes data into the Timer/Counter Set(Preset) value area in the Programmable Controller(PC).	Set(Preset) Value area	No need to specify the memory area code.
RK (52)(4B)	Reads the Timer/Counter Elapsed(Count) Value stored in the Elapsed (Count) Value area.	Elapsed(Count) Value area	No need to specify the memory area code.
WK (57)(4B)	Writes data into the Timer/Counter Elapsed(Count) value area in the Programmable Controller(PC).	Elapsed(Count) Value area	No need to specify the memory area code.

Monitor Commands			
MC (4D)(43)	Specifies the address of external input relays external output relays, internal relays, link relays, and t imer or counter contacts which will be monitored. Resets the points specified by previous "MC" commands.	External input relay External output relay Internal relay Timer contact Counter contact	X Y R T C
MD (4D)(44)	Specifies the addresses of external input relays (word units), external output relays (word units), internal relays (word units), link relays (word units), data registers, link data registers, file registers, index registers(IX or IY) or Timer/Counter Set/Elapsed value which will be monitored. Resets the points specified by previous "MD" commands.	Data register Link data register File register Set(Preset) Value area Elapsed(Count) Value area Index register IX Index register IY Word external input relay Word external output relay Word internal relay	D L F S K IX IY WX WY WR
MG (4D)(47)	Monitors the points specified in "MC" and "MD" commands.	Specified in "MC" and "MD"commands.	No need to specify the memory area code.
System Register Commands			
RR (52)(52)	Reads the contents stored in system registers of the Programmable Controller(PC).	System registers	No need to specify the memory area code.
WR (57)(52)	Writes data into the system registers of Programmable Controller(PC).	System registers	No need to specify the memory area code.
Status Commands			
RT (52)(54)	Reads the status of the Programmable Controller(PC). The Programmable Controller type, program capacity,	Status of the Programmable Controller	No need to specify the memory area code.
Program Commands			
RP (52)(50)	Reads a program stored in the Programmable Controller(PC). Use this command only for a program backup.	Program	No need to specify the memory area code.
WP (57)(50)	Writes the program saved with the "RP" command back into the Programmable Controller(PC). Use this command only for uploading program.	Program	No need to specify the memory area code.
Remote Control Command			
RM (52)(4D)	Remotely controls the operation mode. The operation mode is remotely set to RUN or PROG. mode.	Operation mode.	No need to specify the memory area code.
Control Command			
AB (41)(42)	Aborts a series of messages. Used to abort receiving a response message sent in multiple	————	No need to specify the memory area code.

Note :

- The memory area code with the ※ mark are available only for the FP3.

6. List of Error Codes

The error code is expressed in 2-digit hexadecimal number in the response message.

① Link system error

Error code (Hexadecimal)	Error code (Decimal)	Contents	Description	
15(H)	21	NACK error	• The setting of the data communication (data bit / parity bit / stop bit etc.) is sent to the C-NET Link Unit in differnt format.	• Check the format of communication setting. • Check the connection of the cables and environmental noise level.
16H)	22	WACK error	• In one command frame, two or more geaders (%) or terminators (CR) are recognized at the C-NET Link Unit.	• Check the frame format of the command messages. • Check the connection of the cables and environmental nose level.
1B(H)	27	Not support error	• 119 or more characters are sent to the C-NET Link Unit in one command frame.	• Check the number of characters in one frame.

② Basic error

Error code (Hexadecimal)	Error code (Decimal)	Contents	Description	
28(H)	40	BCC error	• BCC error occurs.	• Check the connection of the cables and environmental noise level.
29(H)	41	Format error	• The command message does not match the MEWTOCOL format.	• Check the command message. (Header / Station No. / Command marker etc.)
2A(H)	42	Not support error	• The command message is sent to not available station. • The command is not supported, etc.	• Check the station No., command and numbers of data specification fam.
2B(H)	43	Procedure error	• Another series of message is sent to the Programmable Controller when a series of message in multiple frames is going.	• Change a program so that another series of message is not sent to the Programmable Controller while one message in multiple frames are not completed.

③ Processing error

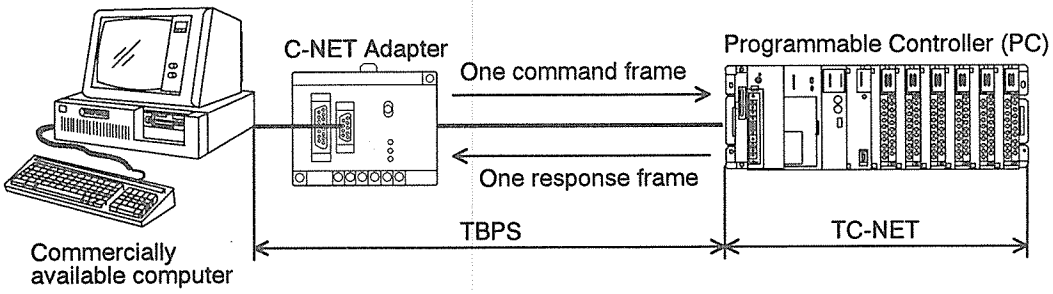
Error code (Hexadecimal)	Error code (Decimal)	Contents	Description	
35(H)	53	Busy error	• Another command message is sent to the Programmable Controller (PC) through another link unit (C-NET Link Unit / Link Unit / C.C.U.), when a series of message is going.	• Change a program so that two or more messages are sent to one Programmable Controller simultaneously.

④ Application error

Error code (Hexadecimal)	Error code (Decimal)	Contents	Description	
3C(H)	60	Parameter	• The specified data or data area code is not available.	• Check the data or data area code.
3D(H)	61	Data error	• The specified data or data area is not available.	• Check the data or data area numbering.
3E(H)	62	Registration error	• The specified data or data area to be monitored or traced are not registered. • The registered data or data area is beyond the limit.	• Check the registration status of the data or data area to be monitored or traced.
3F(H)	63	Programmable Controller (PC) mode error	• The remote mode setting operation is performed when the mode set switch is not set in Remote mode.	• Set the mode set switch to the Remote mode.
41(H)	65	Protect error	• "Write" command message is sent to the Programmable Controller, when the program is in protect enabled (program masked) condition.	• Open the protect.
42(H)	66	Address	• THe specified address is not available.	• Check the address.
43(H)	67	No data error	• There is no comment registration to be read out.	• Register the comment.

7. Communication Time

The communication time is the time required for communications to take place between a computer and a Programmable Controller (PC) through a C-NET Link Unit.
This does not include any processing time by the computer.



TRANSMISSION TIME (T) = TBPS + TC-NET
TBPS : Transmission time for one communication cycle (One command frame / one response frame)
TC-NET : Processing time need by the C-NET Link Unit and the Programable Controller CPU

1) Time for one communication cycle over an RS232C interface (TBPS)

$$TBPS = \left(\frac{TN}{BPS} + TA + \frac{RN}{BPS} \right) \times 1000(ms)$$

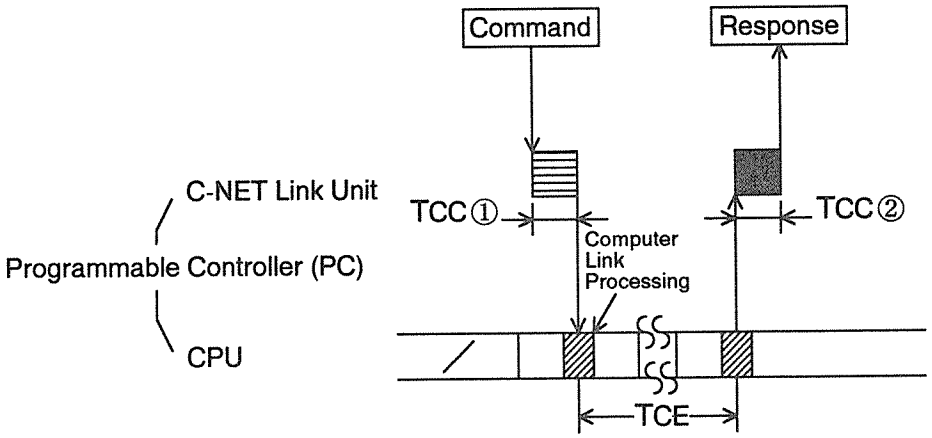
TN : Number of bits transmitted in one command frame
(= Number of characters × Number of bits in one character : see note 1)
TA : Delay time cccuring at transmission
This is caused by the idle bits between two characters.
[Avarage idletime between two characters × (Number of characters − 1)
RN : Number of transmitted bits in a response frame
(= Number of characters × Number of bits in one character : see note1)
BPS : Baud rate
Note 1 : The number of bits in one character
= Start bit (: 1) + Data bits (7 or 8) + Parity bit (: 0 or 1) + Stop bits (: 1 or 2)

Example :
One communication cycle consisting of a command frame (40 characters) and a response message frame (8 characters) with following parameters ;
Start bit = 1; Character bits = 7; Parity bit = 1 ; Stop bit = 1 .
In this example it is assumed that there is no delay time in the transmission caused by the application (TA = 0).

$$TBPS = \left(\frac{40 \times 10}{9600} + \frac{8 \times 10}{9600} \right) \times 1000(ms) = 50ms$$

2) Processing Time needed by the Programmable Controller (TC-NET)

The time needed between receiving a command frame at the C-NET Link Unit and the time when sending a response frame is sent by the C-NET Link Unit is specified as at the Programmable Controller processing time (TC-NET).



TC-NET [Processing time needed by the Programmable Controller] = TCC① + TCE + TCC②

TCC① : The time between reception by the C-NET Link Unit of a command frame and the time needed to transfer the data to Programmable Controller memory.
(1 ms or less)

TCC② : The processing time needed by the C-NET Link Unit to begin sending a response frame back to the computer.
(1 ms or less)

TCE : CPU processing time.
(1 to 2 scan cycles)

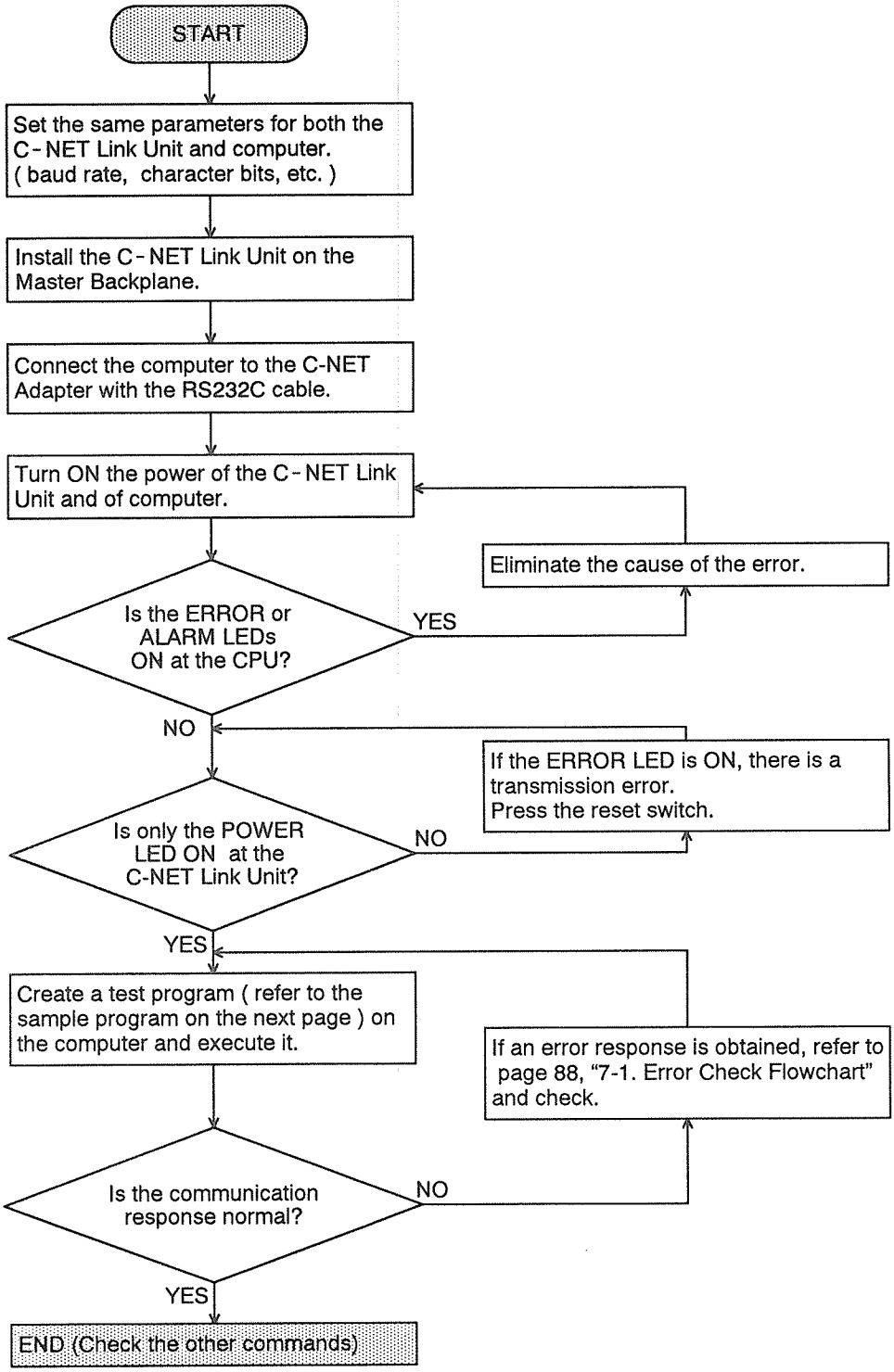
Note :

- The TCE is the scan time needed by the CPU and increases as the program becomes larger.

6-3. Test of Communication Function

1. Procedure

The execution procedure is given below for the test program which checks whether the communication is normal.



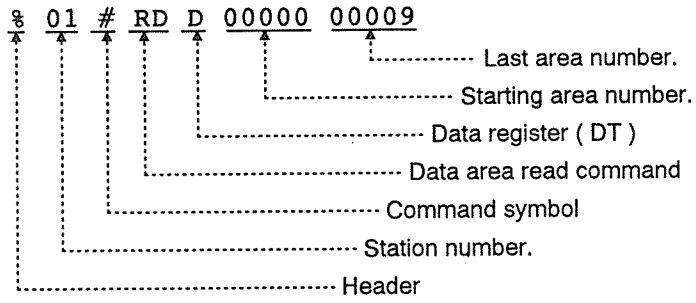
2. Sample Program

The program for reading the data in the area DT0 to DT9 of the Programmable Controller (PC) using data area command.
If you run the program, the response result from a Programmable Controller (PC) and the number of transmission will be displayed on the screen (around at a center of the screen).

```
10 CLS
20 OPEN "COM1:9600,O,7,1" AS #1 ←(1)
30 D$="%01#RDD0000000009" ←(2)
40 B=0:FOR I=1 TO LEN(D$):B=B XOR ASC(MID$(D$,I,1)):NEXT I ←(3)
50 B$=RIGHT$("0"+HEX$(B),2)
60 D$=D$+B$+CHR$(&HD)
70 PRINT #1,D$; ←(4)
80 INPUT #1,R$ ←(5)
90 LOCATE 10,10
100 PRINT R$;" ";J
110 J=J+1
120 GOTO 70
```

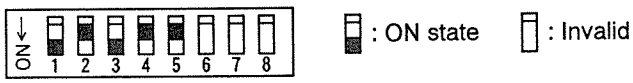
Program explanation

(1) Setting transmission mode (9600 bps, character bits: 7-bit , parity odd, stop bits: 1 bit).
(2) Command message



(3) Calculating BCC.
(4) Sending command.
(5) Receiving command.

C-NET Link Unit Mode Selector Switches setting



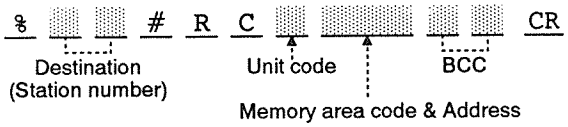
6-4. Command Descriptions

RC Read contact (single point/plural points/word units)

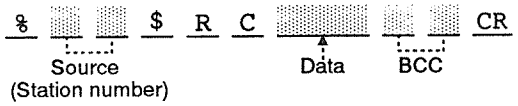
Outline Reads the contents stored in external input relays, external output relays, internal relays, link relays and timer or counter contacts.

Basic message format

Command message



Response message



Memory Area Codes

Relays								Registers			Index registers			Timers/Counters			
X	WX	Y	WY	R	WR	L	WL	D	L	F	IX	IY	ID	T	C	S	K
A	N/A	A	N/A	A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A

A : Available
N/A : Not Available

Notes :

- The codes "X", "Y", "R" and "L" are also used to read data in one word units (1 word = 16 bits).
- Refer to page 42, "4. List of Memory Area Codes in MEWTOCOL-COM" for details.

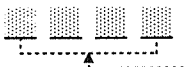
Unit codes

A computer can read a single bit of data, an optional number of bits (1 to 8 bits) or in units of words (1 word = 16 bits).
In order to set the data size for "RC" command, use the following unit codes.

Unit codes	Descriptions	Address numbering system	
		X, Y, R, L	T, C
S	Specify "S" to read a single bit of data.	Relay bit numbering (4-digit)	Decimal numbering (4-digit)
P	Specify "P" to read an optional number of bits (1 to 8 bits).	Relay bit numbering (4-digit)	Decimal numbering (4-digit)
C	Specify "C" to read data in units of words (1 word = 16 bits).	Word numbering (4-digit)	See notes

Notes :

- You can read timer/counter contacts in units of words. However, since timer/counter contacts are not normally treated in units of words, it is recommended that you do not read them in units of words to avoid any numbering system confusion.
  When you specify the timer/counter contacts in this command, refer to the following.



Setting	T/C contact No.
0000	0 to 15
0001	16 to 31
•	•
0015	240 to 255

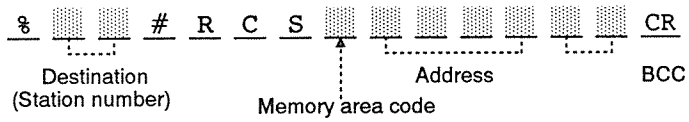
- Refer to page 35, "Memory Configuration of the FP3" for details of the numbering systems.

Description

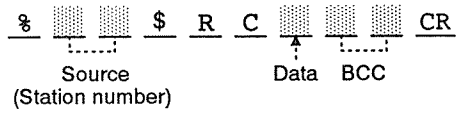
- Reads the contents stored in external input relays, external output relays, internal relays, link relays and timer or counter contacts.
  A computer can read a single bit of data, or an optional number of bits(1 to 8 bits) in one command message.
  It can also read data in units of words(1 word = 16 bits).
- Refer to the following pages for detailed explanations.

When the unit code "S" is specified. [When you want to read a single bit of data.]

Command message



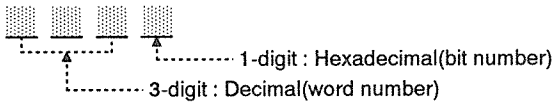
Response message



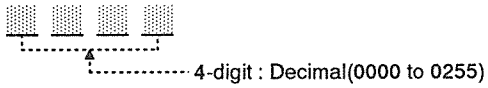
Explanation

① Memory area code : Specify the memory area code for the Programmable Controller(PC) to be read from, referring to the codes given in page 52 "Memory Area Codes".

② Address : The address for X(external input relay), Y(external output relay), R(internal relay) and L(link relay) is expressed using a relay bit numbering system as follows ;



The contact address for T(timer contact) and C(counter contact) is expressed using a decimal numbering sytem as follows;



When you read a timer contact, specify the contact with "T" and when you read a counter contact, specify the contact with "C". However, even if you specify "C" but then use a timer contact address or if you specify "T" and then a counter contact address, the computer will read the contents of the address specified in the command message.

③ Data : Contact data is specified as;
0 : OFF state
1 : ON state

Program example

Command message

```
% 0 1 # R C S X 0 0 0 A * * CR
```

Response message

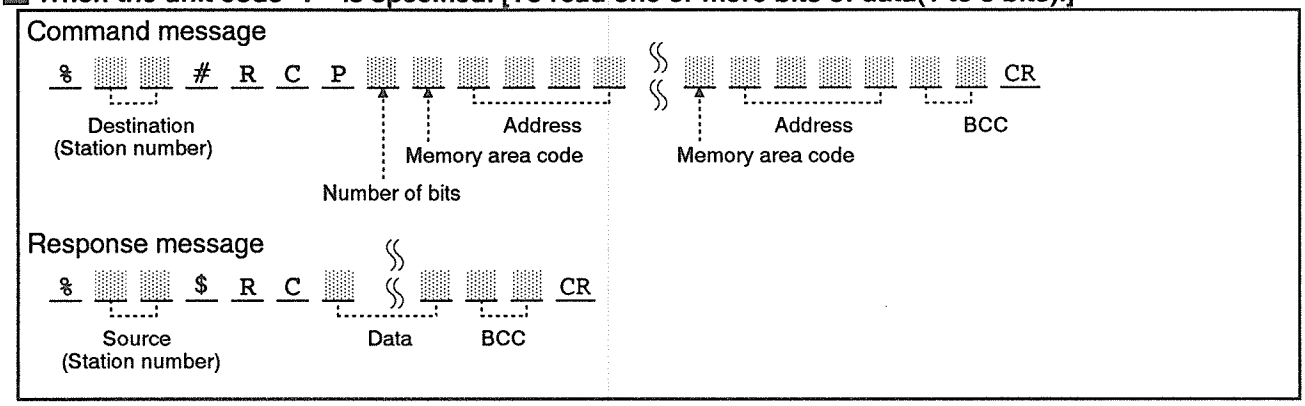
```
% 0 1 $ R C 0 2 1 CR
```

The contents of XA are read by the Programmable Controller(PC) whose station number is 01.

Command message
Destination : 01 station
Point : XA

Response message
Source : 01 station
Data : XA = 0(OFF)

When the unit code "P" is specified. [To read one or more bits of data(1 to 8 bits).]



Explanation

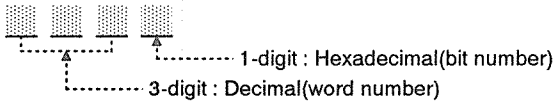
① Number of bits : When you specify "P" in the unit code, you must speify how many bits to read. Specify a number in the range of 1 to 8.

Notes :

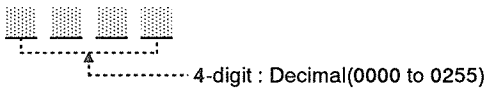
- You must specify a separate memory area code and address for each bit of data you want to access. Thus, you will have to give from 1 to 8 memory area codes and addresses depending on the number of bits you specified.
- A single bit can also be accessed with the unit code "S".

② Memory area code : Specify the memory area code for the Programmable Controller(PC) to be read from, referring to the codes given in page 52 "Memory Area Codes".

③ Address : The address for X(external input relay), Y(external output relay), R(internal relay) and L(link relay) is expressed using a relay bit numbering system as follows ;



The contact address for T(timer contact) and C(counter contact) is expressed using a decimal numbering sytem as follows;



When you read a timer contact, specify the contact with "T" and when you read a counter contact, specify the contact with "C". However, even if you specify "C" but then use a timer contact address or if you specify "T" and then use a counter contact address, the computer will read the contents of the address specified in the command message.

④ Data : Contact data is specified as;

0 : OFF state
1 : ON state

Program example

Command message

```
% 0 1 # R C P 3 X 0 0 0 A Y 0 0 1 F T 0 0 0 5 * * CR
```

Response message

```
% 0 1 $ R C 1 0 0 2 0 CR
```

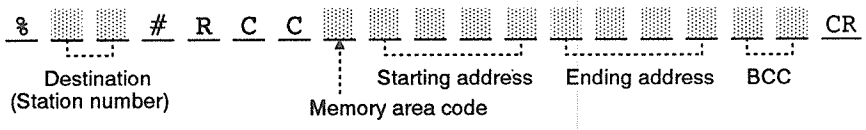
The contents of XA, Y1F and T5 will be read from the Programmable Controller(PC) whose station number is 01.

Command message
- Destination : 01 station
- Number of bits : 3 bits (XA,Y1F,T5)

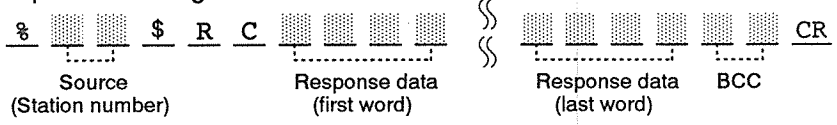
Response message
- Source : 01 station
- Data : XA = 1(ON), Y1F = 0(OFF), T5 = 0(OFF)

When the unit code "C" is specified. [To read bit data in units of words(1 word = 16 bits)].

Command message



Response message



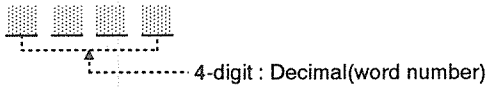
Explanation

① Memory area code : Specify the memory area code for the Programmable Controller(PC) to read from, referring to the codes given in page 52, "Memory Area Codes".

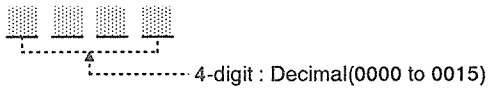
Note :

- The memory area codes used in this command do not have same name as those taht are used in programming in the Programmable Controller(PC).

② Starting address & Ending address :The starting and ending word addresses for X(external input relay), Y(external output relay), R(internal relay) and L(link relay) are expressed using a word numbering system as follows ;



You can read timer/counter contacts in units of words. However, since timer/counter contacts are not normally treated in unit of words, it is recommended that you do not read them in units of words to avoid any numbering system confusion.
When you specify the timer/counter contacts in this command, refer to the following.



Setting	T/C contact No.
0000	0 to 15
0001	16 to 31
•	•
0015	240 to 255

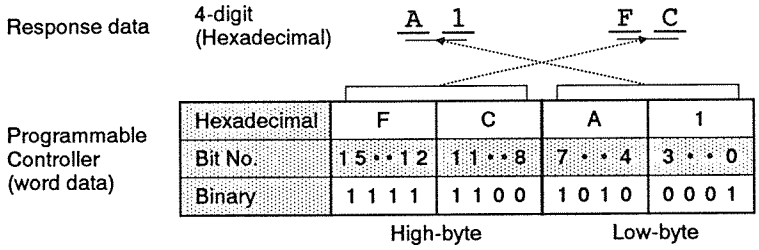
When you read a timer contact, specify the contact with "T" and when you read a counter contact, specify the contact with "C". However, even if you specify "C" but then use a timer contact address or if you specify "T" and then a counter contact address, the computer will read the contents of the address specified in the command message.

Note :

- The ending address must be equal to or larger than the starting address.

③ Response data : 4 characters are returned for each word relay address included in the command in the form shown below.
Data will be returned starting with the data stored in the starting word address specified in the command message.

Response data



Notes :

- The number of words of data that are returned is equal to the ending address minus the starting address plus one.
- The Programmable Controller(PC) stores words in low-byte, high-byte order. Thus, data returned by the Programmable Controller(PC) are in that order.

Program example

Command message

```
% 0 1 # R C C X 0 0 0 0 0 0 0 2 * * CR
```

Response message

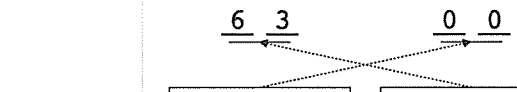
```
% 0 1 $ R C 6 3 0 0 4 4 3 3 0 A 0 0 6 2 CR
```

The contents of externalinput relays[WXO to WX2(X0 to X2F)] will be read from the Programmable Controller(PC) whose station number is 01.

Command message
- Destination : 01 station
- Starting address : WX0
- Ending address : WX2
- Read out range : WX0 to WX2(X0 to X2F)

Response message
- Source : 01 station
- Response data : 6300(H), 4433(H), 0A00(H)
- Actual data in Programmable Controller :WX0 = 0063(H), WX1 = 3344(H), WX2 = 000A(H)

Response data

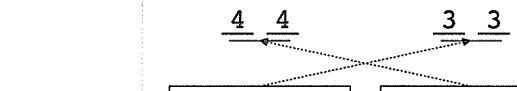


Programmable Controller WX0

Hexadecimal	0	0	6	3
Bit No.	15••12	11••8	7•••4	3•••0
Binary	0 0 0 0	0 0 0 0	0 1 1 0	0 0 1 1

XF X0

Response data

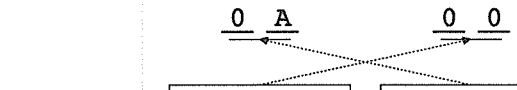


Programmable Controller WX1

Hexadecimal	3	3	4	4
Bit No.	15••12	11••8	7•••4	3•••0
Binary	0 0 1 1	0 0 1 1	0 1 0 0	0 1 0 0

X1F X10

Response data



Programmable Controller WX2

Hexadecimal	0	0	0	A
Bit No.	15••12	11••8	7•••4	3•••0
Binary	0 0 0 0	0 0 0 0	0 0 0 0	1 0 1 0

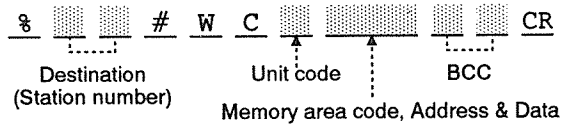
X2F X20

WC Write contact (single point/plural points/word units)

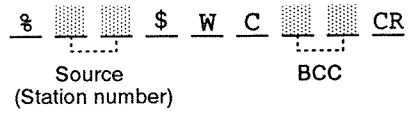
Outline Writes data into external input relays(only for the FP3), output relays, internal relays, link relays and timer or counter contacts.

Basic message format

Command message



Response message



Memory Area Codes

Relays								Registers			Index registers			Timers/Counters			
X	WX	Y	WY	R	WR	L	WL	D	L	F	IX	IY	ID	T	C	S	K
N/A	N/A	A	N/A	A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A

A : Available
N/A : Not Available

Notes :

- The memory area code "X"(external input relay) can be specified only for the FP3.
- The codes "X"(only for the FP3), "Y", "R" and "L" also are used to write data in units of words(1 word = 16 bits).
- Refer to page 42, "4. List of Memory Area Codes in MEWTOCOL-COM" for details.

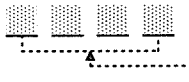
Unit codes

A computer can write a single bit of data, an optional number of bits(1 to 8 bits) or in units of words(1 word = 16 bits).
In order to set the data size for "WC" command, use the following unit codes.

Unit codes	Descriptions	Address numbering system	
		X, Y, R, L	T, C
S	Specify "S" to write a single bit of data.	Relay bit numbering (4-digit)	Decimal numbering (4-digit)
P	Specify "P" to write an optional number of bits(1 to 8 bits).	Relay bit numbering (4-digit)	Decimal numbering (4-digit)
C	Specify "C" to read data in units of words(1 word = 16 bits).	Word numbering (4-digit)	See notes

Notes :

- You can write data to timer/counter contacts in units of words. However, since timer/counter contacts are not normally treated in units of words, it is recommended that you do not write them in units of words to avoid any numbering system confusion.
  When you specify the timer/counter contacts in this command, refer to the following.



Setting	T/C contact No.
0000	0 to 15
0001	16 to 31
•	•
0015	240 to 255

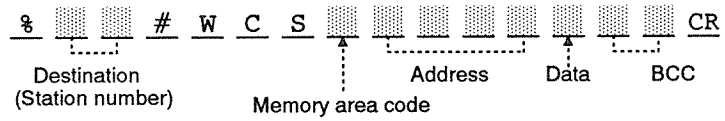
- Refer to page 35, "Memory Configuration of the FP3" for details of the numbering systems.

Description

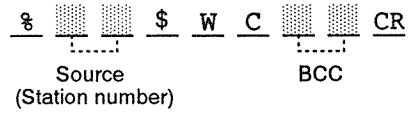
- Writes data into external input relays(only for the FP3), external output relays, internal relays, link relays and timer or counter contacts.
  A computer can write a single bit of data, or an optional number of bits(1 to 8 bits) in one command message.
  It can also write data in units of words(1 word = 16 bits).
- Refer to the following pages for detailed explanations.

When the unit code " S " is specified. [When you want to write a single bit of data.]

Command message



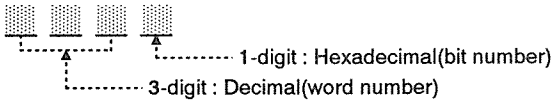
Response message



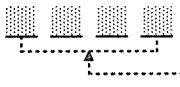
Explanation

① Memory area code : Specify the memory area code for the Programmable Controller(PC) to be written into, referring to the codes given in page 60 "Memory Area Codes".

② Address : The address for X[(external input relay) only for the FP3], Y(external output relay), R(internal relay) and L(link relay) is expressed using a relay bit numbering system as follows ;



The contact address for T(timer contact) and C(counter contact) is expressed using a decimal numbering sytem as follows;



When you write data to a timer contact, specify the contact with "T" and when you write a data to a counter contact, specify the contact with "C". However, even if you specify "C" but then use a timer contact address or if you specify "T" and then a counter contact address, the computer will write the contents of the address specified in the command message.

③ Data : Contact data is specified as;
0 : OFF state
1 : ON state

Program example

Command message

```
% 0 1 # W C S Y 0 0 0 A 1 * * CR
```

Response message

```
% 0 1 $ W C 1 4 CR
```

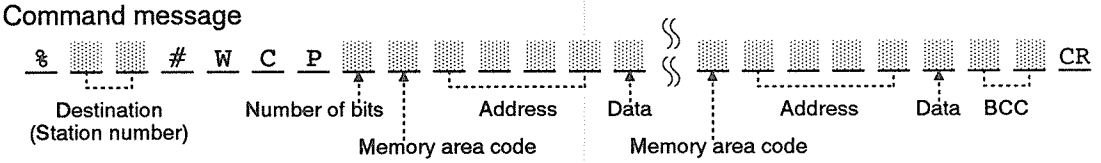
The data(1 = ON) is written to external output relay(YA) of the Programmable Controller(PC) whose station number is 01.

Command message
Destination : 01 station
Point : YA
Data written : 1 (ON)

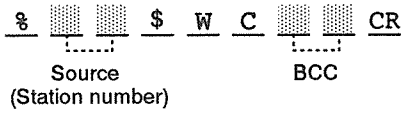
Response message
Source : 01 station

When the unit code "P" is specified. [To write one or more bits of data(1 to 8 bits).]

Command message



Response message



Explanation

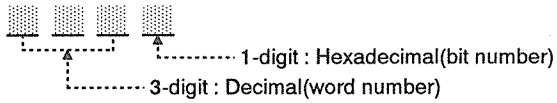
① Number of bits : When you specify "P" in the unit code, you must speify how many bits to write. Specify a number in the range of 1 to 8.

Note :

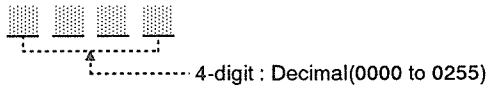
- You must specify a separate memory area code, address and data for each bit of data you want to access. Thus, you will have to give from 1 to 8 memory area codes, addresses and data depending on the number of bits you specified.
- A single bit can also be accessed with the unit code "S".

② Memory area code : Specify the memory area code for the Programmable Controller(PC) to be written into, referring to the codes given in page 60 "Memory Area Codes".

③ Address : The address for X[(external input relay)only for FP3], Y(external output relay), R(internal relay) and L(link relay) is expressed using a relay bit numbering system as follows ;



The contact address for T(timer contact) and C(counter contact) is expressed using a decimal numbering sytem as follows;



When you write a data to a timer contact, specify the contact with "T" and when you write a data to a counter contact, specify the contact with "C". However, even if you specify "C" but then use a timer contact address or if you specify "T" and then a counter contact address, the computer will write the contents of the address specified in the command message.

④ Data : Contact data is specified as;
0 : OFF state
1 : ON state

Program example

Command message

```
% 0 1 # W C P 3 Y 0 0 0 A 0 Y 0 0 1 F 1 T 0 0 0 5 0 * * CR
```

Response message

```
% 0 1 $ W C 1 4 CR
```

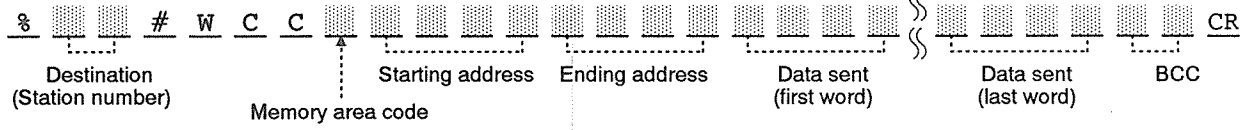
The data(0 = OFF, 1 = ON, 0 = OFF) are written to the external relays(YA and Y1F) and the timer contact(T5) of the Programmable Controller(PC).

Command message
- Destination : 01 station
- Number of bits : 3 bits (YA,Y1F,T5)
- Data written : YA = 0(OFF), Y1F = 1(ON), T5 = 0(OFF)

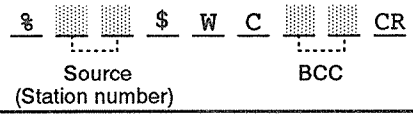
Response message
- Source : 01 station

When the unit code "C" is specified. [To write data in units of words(1 word = 16 bits).]

Command message



Response message



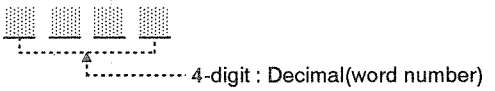
Explanation

① Memory area code : Specify the memory area code for the Programmable Controller(PC) to be written into, referring to the codes given in page 60, "Memory Area Codes".

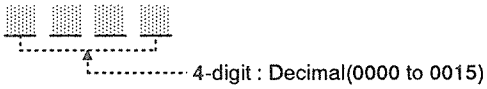
Note :

- The memory area codes used in this command do not have same name as those that are used in programming the Programmable Controller(PC).

② Starting address
& Ending address : The starting and ending word addresses for X[(external input relay)only for FP3], Y(external output relay), R(internal relay) and L(link relay) are expressed using a word numbering system as follows ;



You can write data to timer/counter contacts in units of words. However, since timer/counter normally contacts are not normally treated in units of words, it is recommended that you do not read them in units of words to avoid any numbering system confusion.
When you specify the timer/counter contacts in this command, refer to the following.



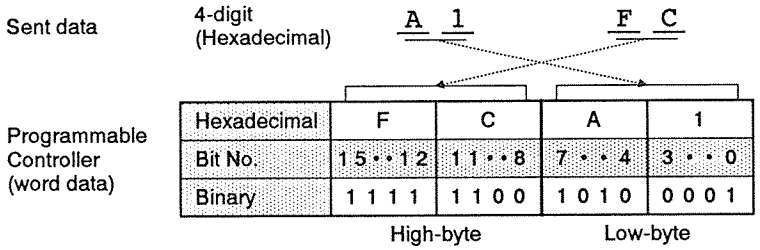
Setting	T/C contact No.
0000	0 to 15
0001	16 to 31
•	•
0015	240 to 255

When you write data to the timer contacts, specify the contact with "T" and when you write data to the counter contacts, specify the contact with "C". However, even if you specify "C" but then use a timer contact address or if you specify "T" and then a counter contact address, the computer will write the contents of the address specified in the command message.

Note :

The ending address must be equal to or larger than the starting address.

③ Data sent : 4 characters are used to write one of word data in the form shown below.
Data will be sent to the Programmable Controller(PC) in order from the starting to the ending addresses.



Notes :

- The number of words of data that are sent is equal to the ending address minus the starting address plus one.
- The Programmable Controller(PC) stores words in low-byte, high-byte order. Thus, data sent to the Programmable Controller(PC) must be in that order.

Program example

Command message

```
% 0 1 # W C C R 0 0 0 0 0 0 0 2 6 3 0 0 4 4 3 3 0 A 0 0 * * CR
```

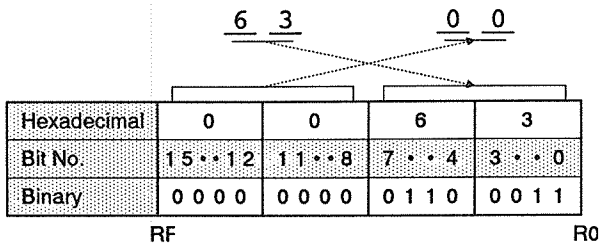
Response message

```
% 0 1 $ W C 1 4 CR
```

The data[6300(H), 4433(H), 0A00(H)] will be written into the address block [WR0 to WX2(R0 to R2F)].

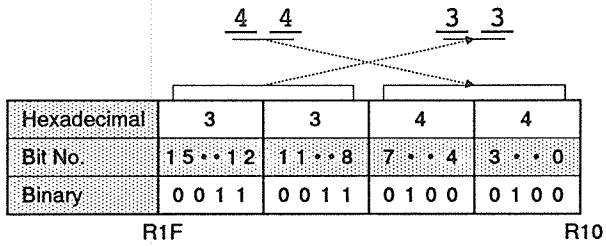
Command message
Destination : 01 station
Starting address : WR0
Ending address : WR2
Data write block : WR0 to WR2(R0 to R2F)
Data sent : 6300(H), 4433(H), 0A00(H)
Actual data in Programmable Controller :WR0 = 0063(H), WR1 = 3344(H), WR2 = 000A(H)

Data sent



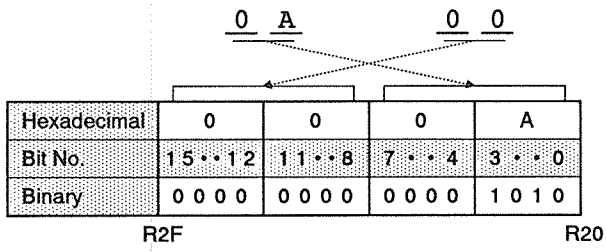
Programmable Controller WR0

Data sent



Programmable Controller WR1

Data sent



Programmable Controller WR2

Response message
Source :01 station

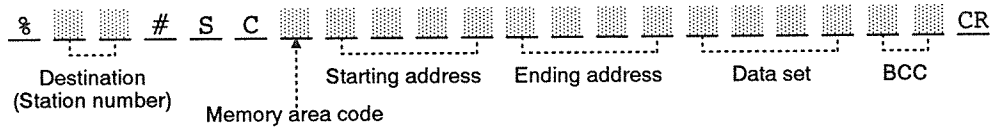
SC Set contact (word units)

Outline

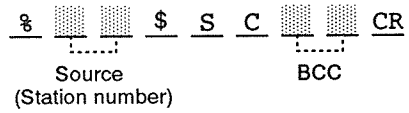
Sets a data pattern(in word units) in external input relays(only for the FP3), output relays, internal relays or link relays.

Basic message format

Command message



Response message



Memory Area Codes

Relays								Registers			Index registers			Timers/Counters			
X	WX	Y	WY	R	WR	L	WL	D	L	F	IX	IY	ID	T	C	S	K
N/A	N/A	A	N/A	A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A : Available
N/A : Not Available

Notes :

- The memory area code X(external input relay) can be specified only for the FP3.
- The codes X(only for the FP3), Y, R and L are also used to write data patterns in units of words (1 word = 16 bits) .
- Refer to page 42, "4. List of Memory Area Codes in MEWTOCOL-COM" for details.

Description

- Sets the data pattern in external input relays(only for the FP3), external output relays, internal relays or link relays.
  The data pattern is written in units of words(one word = 16 bits).

Memory area code

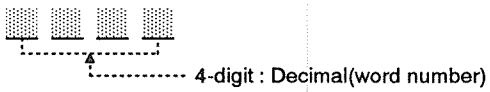
- Specify the memory area code for the Programmable Controller(PC) to be written into, referring to the codes given above in "Memory Area Codes".

Note :

- The memory area codes used in this command do not have same name as those that are used in programming the Programmable Controller(PC).

Starting address/Ending ingaddress

- The starting and ending word addresses for X[(external input relay)only for the FP3], Y(external output relay), R(internal relay) and L(link relay) are expressed using a word numbering system as follows ;

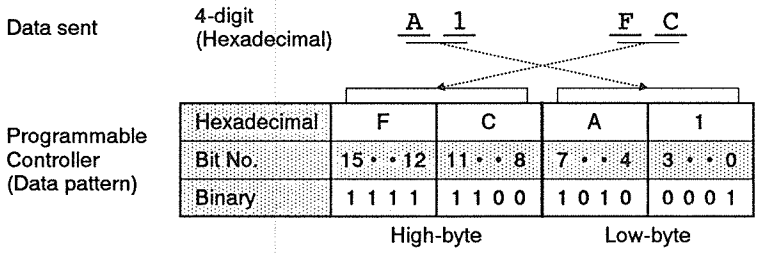


Note :

The ending address must be equal to or larger than the starting address .

Data set

- 4 characters are used to set a data pattern in the form shown below.
  Data will be sent to the Programmable Controller(PC) in order from the starting to the ending addresses.



Note :

- The Programmable Controller(PC) stores words in low-byte, high-byte order. Thus, data sent to the Programmable Controller(PC) must be in that order.

Program example

Command message

```
% 0 1 # S C Y 0 0 0 0 0 0 3 0 A B C D * * CR
```

Response message

```
% 0 1 $ S C 1 0 CR
```

The data[ABCD(H)] will be written to the address block(WY0000 to WY0030).
The command and response messages are recognized as ;

Command message
- Destination : 01 station
- Starting address : WY0
- Ending address : WY30
- Data set block : WY0 to WY30(Y0 to Y30F)
- Data sent : ABCD(H)
- Actual data in Programmable Controller : CDAB(H)

Data sent — 4-digit (Hexadecimal): A B C D

Data pattern

Hexadecimal	C	D	A	B
Bit No.	F • • C	B • • 8	7 • • 4	3 • • 0
Binary	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1

Programmable Controller

Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Address				
WY0000	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
WY0001	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
WY0002	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
WY0003	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
WY0004	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
•				
•				
•				
WY0026	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
WY0027	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
WY0028	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
WY0029	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
WY0030	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1

Response message
- Source : 01 station

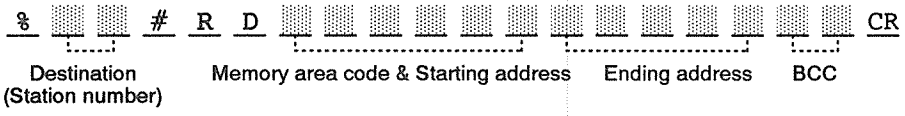
RD Read registers

Outline

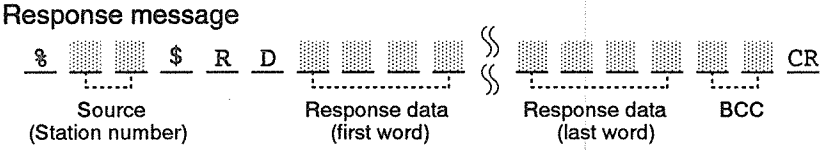
Reads the contents stored in data registers, link data registers, file registers or index registers.

Basic message format

Command message



Response message



Memory Area Codes

Relays								Registers			Index registers			Timers/Counters			
X	WX	Y	WY	R	WR	L	WL	D	L	F	IX	IY	ID	T	C	S	K
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	A	A	A	A	N/A	N/A	N/A	N/A

A : Available
N/A : Not Available

Notes :

- The memory area code ID is used when both the X and the Y index registers.
- Refer to page 42, "4. List of Memory Area Codes in MEWTOCOL-COM" for details.

Description

- Reads the contents stored in data registers, link data registers, file registers, or index registers(IX or/and IY).
  Since the memory area of each register is conifigured as 16 bits(one word), data from a register will be returned in the form of 4-digit hexadecmial.

Memory area code

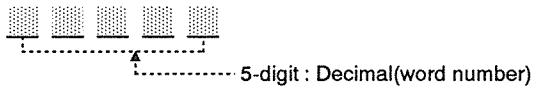
- Specify the memory area code for the Programmable Controller(PC) to be read from, referring to the codes given above in "Memory Area Codes".

Note :

- The memory area codes used in this command do not have same name as those that are used in programming the Programmable Controller(PC).

Starting address/Ending address

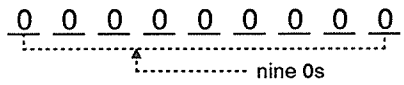
- The starting and ending addresses for D(data registers), L(link data registers) and F(file registers) are expressed using a word numbering system as follows ;



Note :

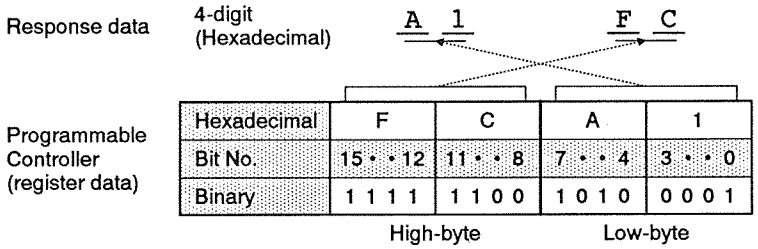
- The ending address must be equal to or larger than the starting address .

- The IX(index register IX), IY(index register IY) and ID(index registers IX and IY) are specified with nine 0s instead of specifying the starting and ending addresses, as the index registers do not have their own numbers with them.



Response data

- 4 characters are returned for each register address included in the command as shown below. Data will be returned from the Programmable Controller(PC) starting with the starting to the ending address.



Notes :

- The number of words of data that are returned is equal to the ending address minus the starting address plus one.
- The Programmable Controller(PC) stores words in low-byte , high-byte order. Thus, data returned by the Programmable Controller(PC) are in that order.

Program example

Command message

```
% 0 1 # R D D 0 1 1 0 5 0 1 1 0 7 * * CR
```

Response message

```
% 0 1 $ R D 6 3 0 0 4 4 3 3 0 A 0 0 6 2 CR
```

- The contents of data registers(DT1105 to DT1107) will be read by the Programmable Controller(PC) whose station number is 01.

Command message
- Destination : 01 station
- Starting address : DT1105
- Ending address : DT1107
- Read out block : DT1105 to DT1107

Response message
- Source : 01 station
- Response data : 6300(H), 4433(H), 0A00(H)
- Actual data in Programmable Controller : DT1105 = 0063(H), DT1106 = 3344(H), DT1107 = 000A(H)

• DT1105

Response data: 4-digit (Hexadecimal) 6 3 0 0

Programmable Controller DT1105

Hexadecimal	0	0	6	3
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 1 1 0	0 0 1 1

• DT1106

Response data: 4-digit (Hexadecimal) 4 4 3 3

Programmable Controller DT1106

Hexadecimal	3	3	4	4
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 1 1	0 0 1 1	0 1 0 0	0 1 0 0

• DT1107

Response data: 4-digit (Hexadecimal) 0 A 0 0

Programmable Controller DT1107

Hexadecimal	0	0	0	A
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 0	1 0 1 0

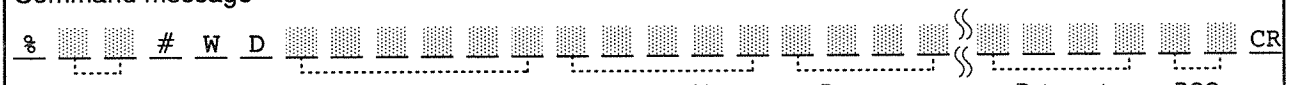
WD Write registers

Outline

Writes data into data registers, link data registers, file registers or index registers.

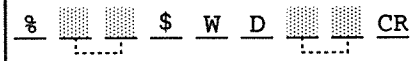
Basic message format

Command message



Destination (Station number) | Memory area code & Starting address | Ending address | Data sent (first word) | Data sent (last word) | BCC

Response message



Source (Station number) | BCC

Memory Area Codes

Relays								Registers			Index registers			Timers/Counters			
X	WX	Y	WY	R	WR	L	WL	D	L	F	IX	IY	ID	T	C	S	K
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	A	A	A	A	N/A	N/A	N/A	N/A

A : Available
N/A : Not Available

Notes :

- The memory area code ID is used when both the X and the Y index registers .
- Refer to page 42, "4. List of Memory Area Codes in MEWTOCOL-COM" for details.

Description

- Writes data to data registers, link data registers, file registers or index registers (IX or/and IY) of the Programmable Controller(PC).
  Since the memory area of each register is conifigured as 16 bits(one word), data to a regiter will be written in the form of 4-digit hexadecmial.

Memory area code

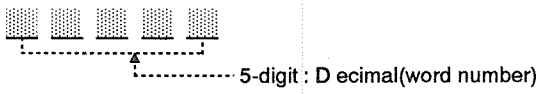
- Specify the memory area code for the Programmable Controller(PC) to be written into, referring to the codes given above in "Memory Area Codes".

Note :

- The memory area codes used in this command do not have same name as those that are used in programming the Programmable Controller(PC).

Starting address/Ending address

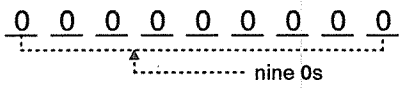
- The starting and ending addresses for "D"(data registers), "L"(link data registers) and F(file registers) are expressed using a word numbering system as follows ;



Note :

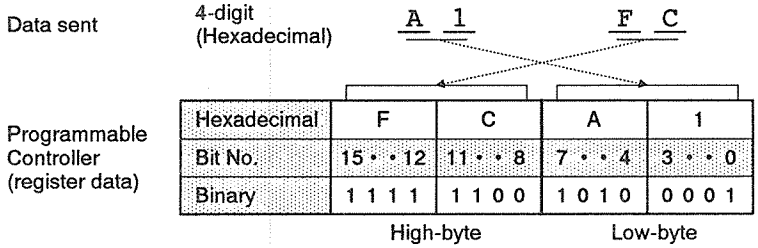
- The ending address must be equal to or larger than the starting address.

- The IX(index register IX), IY(index register IY) and ID(index registers IX and IY) are specified with nine 0s instead of specifying the starting and ending addresses, as the index registers do not have their own numbers with them.



Data sent

- 4 characters are needed for each word of data (one word per register address) as shown below. Data will be sent to the Programmable Controller(PC) in order from the starting to the ending address.



Notes :

- The number of words of data that are sent is equal to the ending address minus the starting address plus one.
- The Programmable Controller(PC) stores words in low-byte, high-byte order. Thus, data sent to the Programmable Controller(PC) must be in that order.
- When the memory area code is "ID", two words of data (8 characters) should be sent in the order IX register data, IY register data.

Program example

Command message

```
% 0 1 # W D D 0 0 0 0 1 0 0 0 0 3 0 5 0 0 0 7 1 5 0 0 0 9 * *CR
```

Response message

```
% 0 1 $ W D 1 3CR
```

The data[0500(H), 0715(H), 0009(H)] will be sent to the specified registers(DT1, DT2, DT3) in the Programmable Controller(PC).

Command message
- Destination : 01 station
- Starting address : DT1
- Ending address : DT3
- Data write block : DT1 to DT3
- Data sent : 0500(H), 0715(H), 0009(H)
- Actual data in Programmable Controller : DT1 = 0005(H), DT2 = 1507(H), DT3 = 0900(H)

Response message
- Source : 01 station

Data sent: 0 5 0 0

Programmable Controller DT1

Hexadecimal	0	0	0	5
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 0	0 1 0 1

Data sent: 0 7 1 5

Programmable Controller DT2

Hexadecimal	1	5	0	7
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 1	0 1 0 1	0 0 0 0	0 1 1 1

Data sent: 0 0 0 9

Programmable Controller DT3

Hexadecimal	0	9	0	0
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	1 0 0 1	0 0 0 0	0 0 0 0

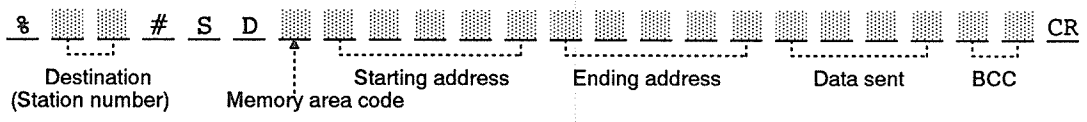
SD Set registers

Outline

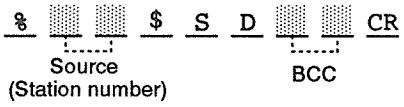
Sets a data pattern in data registers, link data registers or file registers.

Basic message format

Command message



Response message



Memory Area Codes

Relays								Registers			Index registers			Timers/Counters			
X	WX	Y	WY	R	WR	L	WL	D	L	F	IX	IY	ID	T	C	S	K
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A : Available
N/A : Not Available

Note :

- Refer to page 42, "4. List of Memory Area Codes in MEWTOCOL-COM" for details.

Description

- Sets a data pattern in data registers, link data registers or file registers in the Programmable Controller(PC).
  Since the memory area of each register is conifigured as 16 bits(one word), data to a regiter will be written in the form of 4-digit hexadecmial.

Memory area code

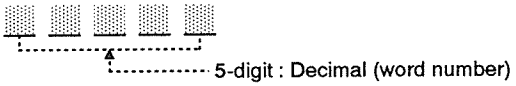
- Specify the memory area code for the Programmable Controller(PC) to be written into, referring to the codes given above in "Memory Area Codes".

Note :

- The memory area codes used in this command do not have same name as those that are used in programming the Programmable Controller(PC).

Starting address/Ending address

- The starting and ending addresses for "D"(data registers), "L"(link data registers) and F(file registers) are expressed using a word numbering system as follows ;

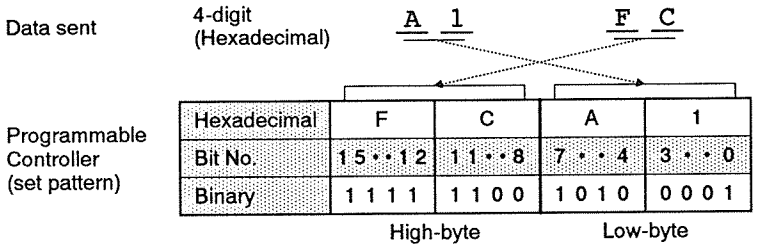


Note :

- The ending address must be equal to or larger than the starting address .

Data set

- 4 characters are needed for each word of data (one word per register address) as shown below. Data will be sent to the Programmable Controller(PC) in order from the starting to the ending addresses.



Note :

- The Programmable Controller(PC) stores words in low-byte, high-byte order. Thus, data sent to the Programmable Controller(PC) must be in that order.

Program example

Command message

```
% 0 1 # S D L 0 0 0 0 0 0 0 0 3 0 A B C D * *CR
```

Response message

```
% 0 1 $ S D 1 6 CR
```

The data[ABCD(H)] will fill the address block(WY0000 to WY0030).

Command message
- Destination : 01 station
- Starting address : LD0
- Ending address : LD30
- Data set block : LDO to LD30
- Data sent : ABCD(H)
- Actual data in Programmable Controller : CDAB(H)

Data sent — 4-digit (Hexadecimal): A B C D

Data pattern

Hexadecimal	C	D	A	B
Bit No.	F • • C	B • • 8	7 • • 4	3 • • 0
Binary	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1

Programmable Controller

Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Address				
LD0	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
LD1	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
LD2	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
LD3	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
LD4	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
•				
•				
•				
LD26	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
LD27	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
LD28	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
LD29	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1
LD30	1 1 0 0	1 1 0 1	1 0 1 0	1 0 1 1

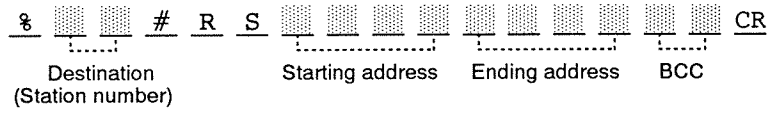
Response message
- Source : 01 station

RS Read the Set (Preset) value "SV" from a Timer/Counter

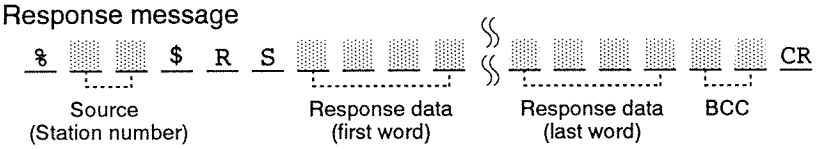
Outline Reads the Timer/Counter Set(Preset) value stored in the Set value area.

Basic message format

Command message



Response message

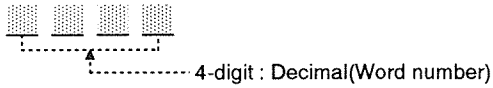


Description

- Reads the Timer/Counter Set(Preset) value stored in the Set value area.
- Since this command is dedicated to reading the Timer/Counter Set (Preset) value from the Programmable Controller(PC), a memory area code is not required.

Starting address/Ending address

- The starting and ending addresses for Timer/Counter Set (Preset) value are expressed using a word numbering system as follows;

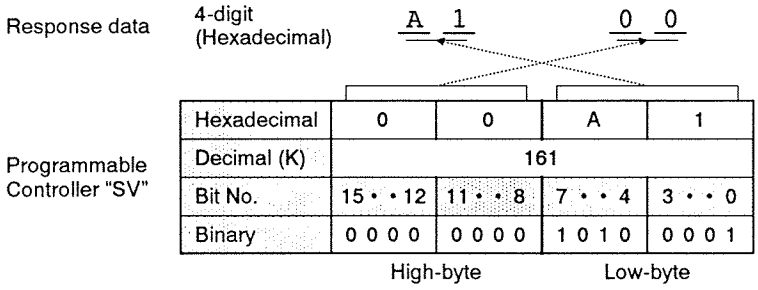


Notes :

- The ending address must be equal to or larger than the starting address.
- Refer to page 35, "Memory Configuration of the FP3" for details.

Response data

- 4 characters are needed for each word of data (one word per "SV" address) as shown below. Data will be read from the Programmable Controller(PC) in order from the starting to the ending addresses.



Note :

- The Programmable Controller (PC) stores words in low-byte, high-byte order. Thus, data returned by the Programmable Controller (PC) are in that order.

Program example

Command message

```
%01#RS0000000200CR
```

Response message

```
%01$RS0500140028000BCR
```

The contents of Timer/Counter Set (Preset) value area (SV0, SV1, SV2) will be returned by the Programmable Controller (PC) whose station number is 01.

Command message
- Destination : 01 station
- Starting address : SV0
- Ending address : SV2
- Read out block : SV0 to SV2

Response message
- Source : 01 station
- Response data : 0500(H), 1400(H), 2800(H)
- Actual data in Programmable Controller : SV0 = 0005(H)[5(K)], SV1 = 0014(H)[20(K)], SV2 = 0028(H)[40(K)]

Response data — 4-digit (Hexadecimal): 0 5 0 0

Programmable Controller "SV0"

Hexadecimal	0	0	0	5
Decimal (K)	5			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 0	0 1 0 1

Response data — 4-digit (Hexadecimal): 1 4 0 0

Programmable Controller "SV1"

Hexadecimal	0	0	1	4
Decimal (K)	20			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 1	0 1 0 0

Response data — 4-digit (Hexadecimal): 2 8 0 0

Programmable Controller "SV2"

Hexadecimal	0	0	2	8
Decimal (K)	40			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 1 0	1 0 0 0

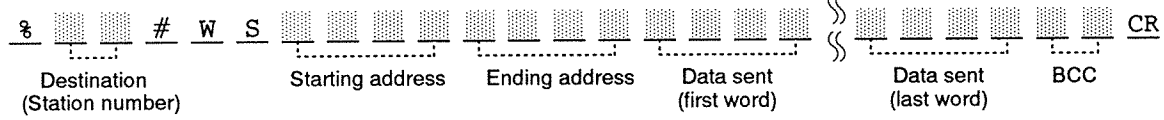
WS Write a Set (Preset) value for a Timer/Counter into a Set (Preset) Value area

Outline

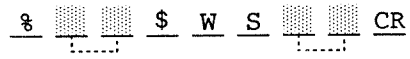
Writes data into the Timer/Counter Set (Preset) value area in the Programmable Controller (PC).

Basic message format

Command message



Response message

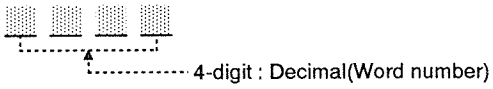


Description

- Writes the data into the specified Timer/Counter Set (Preset) value area.
- Since this command is dedicated to writing the Timer/Counter Set (Preset) value into a Set (Preset) value area of the Programmable Controller(PC), a memory area code is not required.

Starting address/Ending address

- The starting and ending addresses for Timer/Counter Set (Preset) value are expressed using a word numbering system as follows;

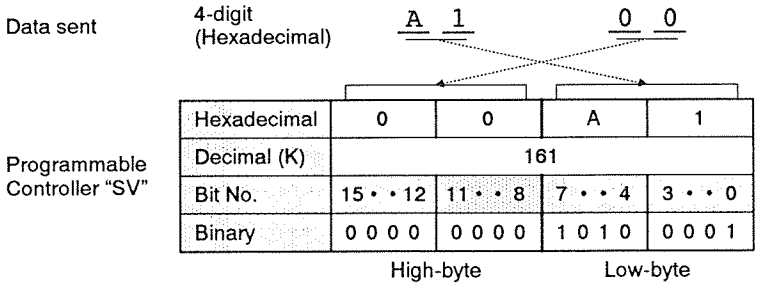


Notes :

- The ending address must be equal to or larger than the starting address.
- Refer to page 35, "Memory Configuration of the FP3" for details.

Data sent

- 4 characters are needed for each word data (one word per "SV" address) as shown below. Data will be sent to the Programmable Controller(PC) in order from the starting to the ending addresses.



Note :

- The Programmable Controller (PC) stores words in low-byte, high-byte order. Thus, data sent to the Programmable Controller (PC) must be in that order.

Program example

Command message

```
% 0 1 # W S 0 0 0 0 0 0 0 2 0 5 0 0 1 4 0 0 2 8 0 0 * * CR
```

Response message

```
% 0 1 $ W S 0 4 CR
```

The data [0500(H), 1400(H), 2800(H)] will be sent to the Timer/Counter Set (Preset) value areas (SV0, SV1, SV2) of the Programmable Controller(PC) whose station number is 01.

Command message
- Destination : 01 station
- Starting address : SV0
- Ending address : SV2
- Read out block : SV0 to SV2
- Data sent : 0500(H), 1400(H), 2800(H)

Response message
- Source : 01 station
- Actual data in Programmable Controller : SV0 = 0005(H)[5(K)], SV1 = 0014(H)[20(K)], SV2 = 0028(H)[40(K)]

Data sent — 4-digit (Hexadecimal): 0 5 | 0 0

Programmable Controller "SV0"

Hexadecimal	0	0	0	5
Decimal (K)	5			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 0	0 1 0 1

Data sent — 4-digit (Hexadecimal): 1 4 | 0 0

Programmable Controller "SV1"

Hexadecimal	0	0	1	4
Decimal (K)	20			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 1	0 1 0 0

Data sent — 4-digit (Hexadecimal): 2 8 | 0 0

Programmable Controller "SV2"

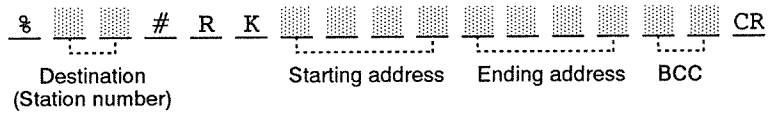
Hexadecimal	0	0	2	8
Decimal (K)	40			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 1 0	1 0 0 0

RK Read the Elapsed (Count) value "EV" from a Timer/Counter

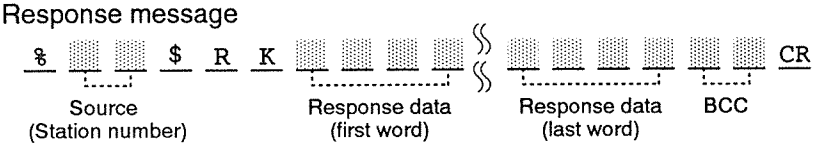
Outline Reads the Timer/Counter Elapsed (Count) value stored in the Elapsed value area.

Basic message format

Command message



Response message

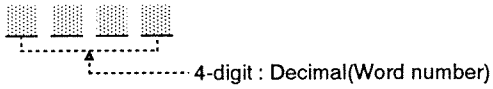


Description

- Reads the Timer/Counter Elapsed (Count) value stored in the Elapsed value area.
- Since this command is dedicated to reading the Timer/Counter Elapsed (Count) value from the Programmable Controller(PC), a memory area code is not required.

Starting address/Ending address

- The starting and ending addresses for Timer/Counter Elapsed(Count) value are expressed using a word numbering system as follows;



Notes :

- The ending address must be equal to or larger than the starting address.
- Refer to page 35, "Memory Configuration of the FP3" for details.

Response data

- 4 characters are needed for each word data (one word per "EV" address) as shown below. Data will be read from the Programmable Controller(PC) in order from the starting to the end addresses.

Response data 4-digit (Hexadecimal) A 1 0 0

Programmable Controller "EV"

Hexadecimal	0	0	A	1
Decimal (K)	161			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	1 0 1 0	0 0 0 1
	High-byte		Low-byte	

Note :

- The Programmable Controller (PC) stores words in low-byte, high-byte roder. Thus, data returned by the Programmable Controller (PC) are in that order.

Program example

Command message

```
% 0 1 # R K 0 0 0 0 0 0 0 2 * * CR
```

Response message

```
% 0 1 $ R K 0 5 0 0 1 4 0 0 2 8 0 0 1 F CR
```

The contents of Timer/Counter Elapsed (Count) value area (EV0, EV1, EV2) will be returned by the Programmable Controller (PC) whose station number is 01.

Command message
- Destination : 01 station
- Starting address : EV0
- Ending address : EV2
- Read out block : EV0 to EV2

Response message
- Source : 01 station
- Response data : 0500(H), 1400(H), 2800(H)
- Actual data in Programmable Controller : EV0 = 0005(H)[5(K)], EV1 = 0014(H)[20(K)], EV2 = 0028(H)[40(K)]

Response data — 4-digit (Hexadecimal): 0 5 0 0

Programmable Controller "EV0"

Hexadecimal	0	0	0	5
Decimal (K)	5			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 0	0 1 0 1

Response data — 4-digit (Hexadecimal): 1 4 0 0

Programmable Controller "EV1"

Hexadecimal	0	0	1	4
Decimal (K)	20			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 1	0 1 0 0

Response data — 4-digit (Hexadecimal): 2 8 0 0

Programmable Controller "EV2"

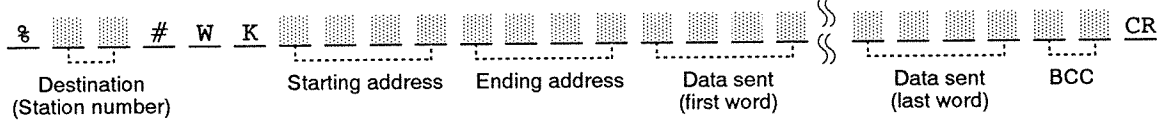
Hexadecimal	0	0	2	8
Decimal (K)	40			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 1 0	1 0 0 0

WK Write an Elapsed (Count) value for a Timer/Counter into an Elapsed (Count) Value area

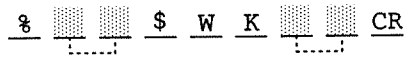
Outline Writes data into the Timer/Counter Elasped (Count) value area in the Programmable Controller (PC).

Basic message format

Command message



Response message

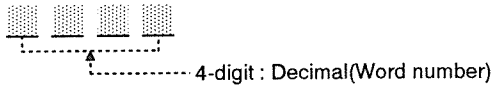


Description

- Writes data into the specified Timer/Counter Elapsed (Count) value area.
- Since this command is dedicated to writing the Timer/Counter Elapsed (Count) value into an Elapsed (Count) value area of the Programmable Controller(PC), a memory area code is not required.

Starting address/Ending address

- The starting and ending addresses for Timer/Counter Elapsed (Count) value are expressed using a word numbering system as follows;

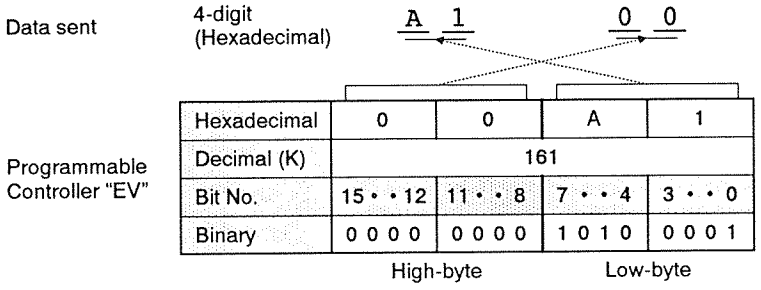


Notes :

- The ending address must be equal to or larger than the starting address.
- Refer to page 35, "Memory Configuration of the FP3" for details.

Data sent

- 4 characters are needed for each word data (one word per "EV" address) as shown below. Data will be sent to the Programmable Controller(PC) in order from the starting to the ending addresses.



Note :

- The Programmable Controller (PC) stores words in low-byte, high-byte order. Thus, data sent to the Programmable Controller (PC) must be in that order.

Program example

Command message

```
% 0 1 # W K 0 0 0 0 0 0 0 2 0 5 0 0 1 4 0 0 2 8 0 0 * * CR
```

Response message

```
% 0 1 $ W K 1 A CR
```

The data [0500(H), 1400(H), 2800(H)] will be sent to the Timer/Counter Set (Preset) value areas (EV0, EV1, EV2) of the Programmable Controller(PC) whose station number is 01.

Command message
- Destination : 01 station
- Starting address : EV0
- Ending address : EV2
- Read out block : EV0 to EV2
- Data sent : 0500(H), 1400(H), 2800(H)

Response message
- Source : 01 station
- Actual data in Programmable Controller : EV0 = 0005(H)[5(K)], EV1 = 0014(H)[20(K)], EV2 = 0028(H)[40(K)]

Data sent — 4-digit (Hexadecimal): 0 5 0 0

Programmable Controller "EV0"

Hexadecimal	0	0	0	5
Decimal (K)	5			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 0	0 1 0 1

Data sent — 4-digit (Hexadecimal): 1 4 0 0

Programmable Controller "EV1"

Hexadecimal	0	0	1	4
Decimal (K)	20			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 0 1	0 1 0 0

Data sent — 4-digit (Hexadecimal): 2 8 0 0

Programmable Controller "EV2"

Hexadecimal	0	0	2	8
Decimal (K)	40			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 1 0	1 0 0 0

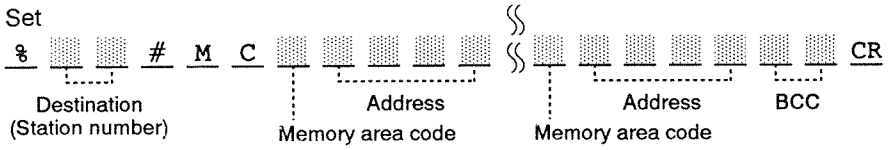
MC Specify contact addresses to be monitored Reset contact addresses that are being monitored

Outline Specifies the addresses of external input relays, external output relays, internal relays, link relays and timer or counter contacts.
Resets the points specified by previous "MC" commands.

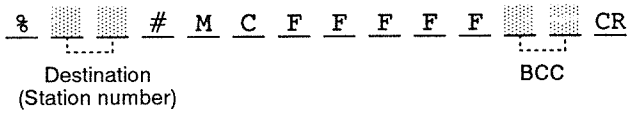
Basic message format

Command message

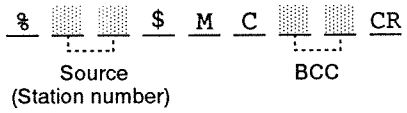
Set



Reset



Response message



Memory Area Codes

Relays								Registers			Index registers			Timers/Counters			
X	WX	Y	WY	R	WR	L	WL	D	L	F	IX	IY	ID	T	C	S	K
A	N/A	A	N/A	A	N/A	A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	A	A	N/A	N/A

A : Available
N/A : Not Available

Note :

Refer to page 42, "4. List of Memory Area Codes in MEWTOCOL-COM" for details.

Description

- Specifies addresses of external input relays, external output relays, internal relays, link relays and timer or counter contacts to be monitored, or it resets the points previously specified by an "MC" command.

Notes :

- A maximum of 20 contacts can be specified in one command message.
- A maximum of 80 points can be specified for one station.

- The points specified in an "MC" command are monitored by executing an "MG" command.

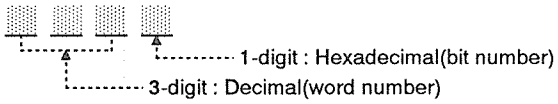
When specifying the contacts to be monitored

① Memory area code : Specify the memory area code for the Programmable Controller(PC) contacts to be monitored, referring to the codes given page 88, "Memory Area Codes".

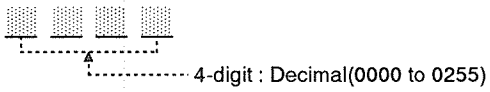
Notes :

- You can specify several different memory areas in one command message.
- When you want to specify plural points, you should specify each point with a combination of memory area codes and addresses.
- When you reset the points specified by "MC" commands, memory area codes are not required.

② Address setting : The addresses for X (external input relay), Y (external output relay), R (internal relay) and L (link relay) are expressed using relay bit numbering system as follows ;



The contact addresses for T (timer contact) and C (counter contact) are expressed using a decimal numbering sytem as follows;



When you specify a timer contact, specify the contact with "T" and when you specify a counter contact, specify the contact with "C". However, even if you specify "C" but then use a timer contact address or if you specify "T" and then a counter contact address, the computer will read the contents of the address specified in the command message.

Program example

Command message

```
% 0 1 # M C X 0 0 0 0 Y 0 0 1 A T 0 0 0 2 * *CR
```

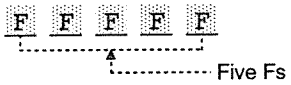
Response message

```
% 0 1 $ M C 0 ECR
```

The points to be monitored (X0, Y1A, T2) will be specified.

To reset the points specified by a previous "MC" command

- To reset the points specified by a previous "MC" command, five "F"s are used in place of a memory area code and address as follows;



Program example

Command message

```
%01#MCFFFFF**CR
```

Response message

```
%01$MC0ECR
```

All points specified using the "MC" command will be cancelled.

MD

Specify registers, relays (word units) or Timer/Counter Set/Elapsed values to be monitored
Reset the registers, relays (word units) or Timer/Counter Set/Elapsed values monitored

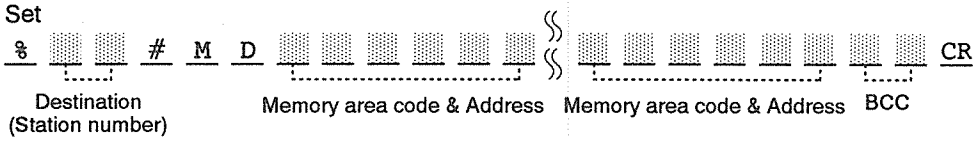
Outline

Specifies the addresses of external input relays (word units), external output relays (word units), internal relays (word units), link relays (word units), data registers, link data registers, file registers, index registers (IX or IY) or Timer/Counter Set/Elapsed value which will be monitored.
Resets the points specified by previous "MD" commands.

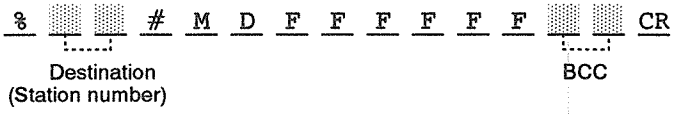
Basic message format

Command message

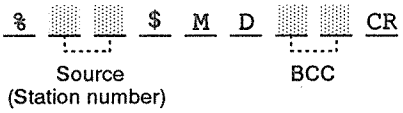
Set



Reset



Response message



Memory Area Codes

Relays								Registers			Index registers			Timers/Counters			
X	WX	Y	WY	R	WR	L	WL	D	L	F	IX	IY	ID	T	C	S	K
N/A	A	N/A	A	N/A	A	N/A	A	A	A	A	A	A	N/A	N/A	N/A	A	A

A : Available
N/A : Not Available

Note :

Refer to page 42, "4. List of Memory Area Codes in MEWTOCOL-COM" for details.

Description

- Specifies the addresses of external input relays (word units), external output relays (word units), internal relays (word units), link relays (word units), data registers, link data registers, file registers or Timer/Counter Set/Elapsed value to be monitored, or it resets the points specified by a previous "MD" command.

Notes :

- A maximum of 16 registers can be specified in one command message.
- A maximum of 16 points can be specified for one station.

- The points specified in an "MD" command are monitored by executing an "MG" command.

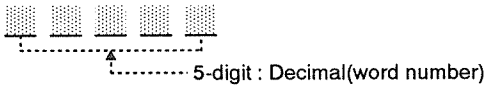
When specifying the points to be monitored

① Memory area code : Specify the memory area code of the Programmable Controller(PC) to be monitored, referring to the codes given page 91, "Memory Area Codes".

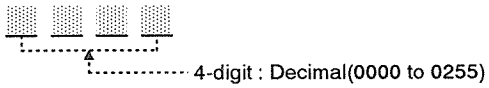
Notes :

- You can specify several different memory area codes in one command message.
- When you want to specify plural points, you should specify each point with a combination of memory area codes and addresses.
- When you reset the points specified by "MD" commands, memory area codes are not required.

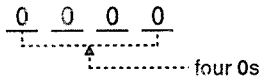
② Address setting : The addresses for "D"(data registers), "L"(link data regsiters), "F"(file registers), "S"(Timer/Counter Set value) and "E"(Timer/Counter Elapsed value) are expressed using a 5-digit word numbering system as follows ;



The addresses for "WX"(word external input relays) and "WY"(word external output relays), "WR"(word internal relays) and "WL"(word link relays) are expressed using a 4-digit word numbering system as follows;



The "IX"(X type index registers) and the "IY"(Y type index registers) are specified using four 0s instead of specifying an address since the index registers do not have their multiple addresses.



Program example

Command message

```
% 0 1 # M D W X 0 0 0 0 D 0 0 0 1 0 S 0 0 0 0 2 * * CR
```

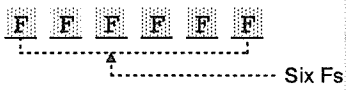
Response message

```
% 0 1 $ M D 0 9 CR
```

The points to be monitored [WX0 (X0 to XF), DT10, SV2] will be specified.

To reset the points specified by a previous "MD" command

- To reset the points specified by a previous "MD" command, six "F"s are used in place of a memory area code and address as follows;



Program example

Command message

```
%01#MDFFFFFF**CR
```

Response message

```
%01$MD09CR
```

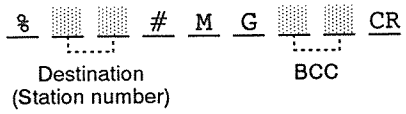
All points specified using the "MD" command will be cancelled.

MG Monitor the points specified in "MC" and "MD" commands

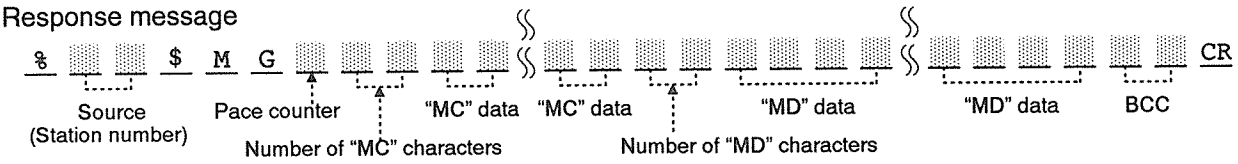
Outline Monitor the points specified in "MC" and "MD" commands.

Basic message format

Command message



Response message



Description

- The contacts and registers preset with the "MC" and "MD" commands are monitored.

Pace counter

- The number of scans executed since last "MG" response message is returned.
  If 1 to 9 scans, a one digit number (1 to 9) is returned.
  If 10 scans or more, the character "A" is returned.

Number of characters for "MC" data

- The total number of characters of data required to return information about each of the points specified in the "MC" command will be expressed as 2-digit hexadecimal number [00(H) to 14(H)].

Note :

- Since a maximum of 80 points can be specified and 8 points are expressed using a 2-digit hexadecimal number, a maximum of 20 [14(H)] characters will be used to return this information.

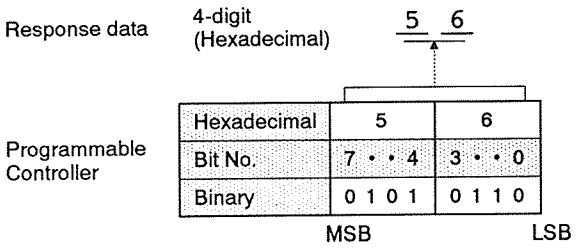
"MC" data

- 8 bits of data will be returned as a 2-digit hexadecimal number using 2 characters as shown below.

Response data (Hex)	Binary	Specifications
Lower digit	0th LSB	Status of the 1st set bit
	1st	Status of the 2nd set bit
	2nd	Status of the 3rd set bit
	3rd	Status of the 4th set bit
Upper digit	4th	Status of the 5th set bit
	5th	Status of the 6th set bit
	6th	Status of the 7th set bit
	7th MSB	Status of the 8th set bit

0 = OFF
1 = ON

Example : Response data ; "56"



■ Number of characters for "MD" data

- The total number of characters of data required to return information about each of the points specified in the "MD" command will be expressed as a 2-digit hexadecimal number [00(H) to 40(H)].

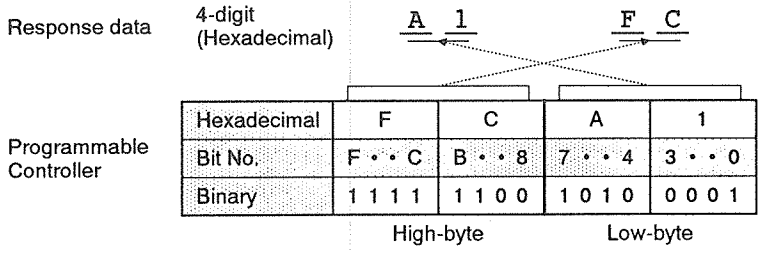
Note :

- Since a maximum of 16 points can be specified and each point is expressed using a 4-digit hexadecimal number, a maximum of 64 [40(H)] characters will be used to return this information.

■ "MD" data

- Each data will be returned as hexadecimal number using 4 characters as shown below.

Example ; Response data; "A1FC"



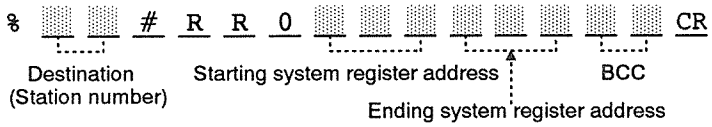
RR Read the contents of the system registers

Outline

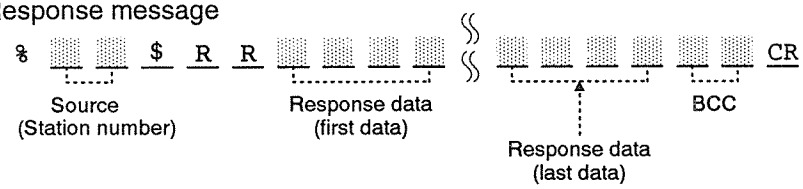
Reads the contents stored in system registers of the Programmable Controller (PC).

Basic message format

Command message



Response message

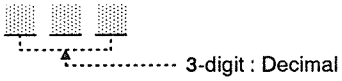


Description

- The contents of the system registers in the Programmable Controller (PC) are returned.
- "0" must be always placed between the command code and the starting system register number.

Starting/ending system register addresses

- The starting and ending system register addresses are expressed using a form as shown below;

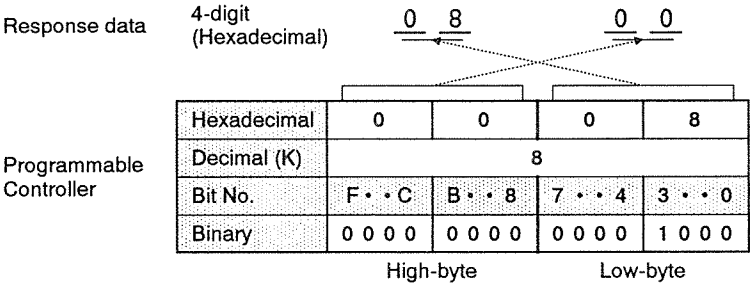


Note :

The ending system register address must be equal to or larger than the starting system register address.

Response data

- 4 characters are needed for each system register data (one word per system register address) as shown below.
  Data will be returned from the Programmable Controller(PC) in order from the starting to the ending system register addresses.



Note :

Refer to page 117, "Table of FP3 System Registers", for detailed information of the system registers.

Program example

Command message
% 0 1 # R R 0 0 0 5 0 0 7 * * CR

Response message
% 0 1 $ R R C 8 0 0 C 8 0 0 3 C 0 0 7 0 CR

The contents of system registers (numbers 5 to 7) will be returned by the Programmable Controller (PC) whose station number is 01.

Command message
- Destination : 01 station
- Starting number : System register 5
- Ending number : System register 7

Response message
- Source : 01 station
- Response data : C800(H), C800(H), 3C00(H)
- Actual data in Programmable Controller : System register 5 = 00C8(H), System register 6 = 00C8(H), System register 7 = 003C(H)

Response data 4-digit (Hexadecimal) C 8 0 0

Programmable Controller System register 5

Hexadecimal	0	0	C	8
Decimal (K)	200			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	1 1 0 0	1 0 0 0

Response data 4-digit (Hexadecimal) C 8 0 0

Programmable Controller System register 6

Hexadecimal	0	0	C	8
Decimal (K)	200			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	1 1 0 0	1 0 0 0

Response data 4-digit (Hexadecimal) 3 C 0 0

Programmable Controller System register 7

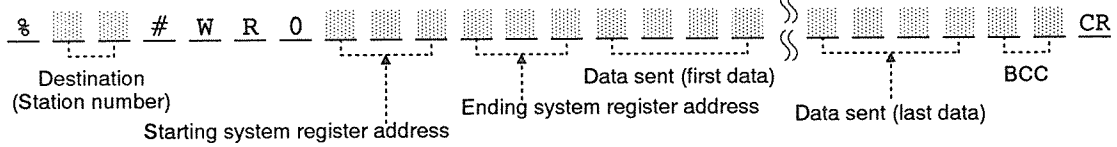
Hexadecimal	0	0	3	C
Decimal (K)	60			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 1 1	1 1 0 0

WR Write data into the system registers

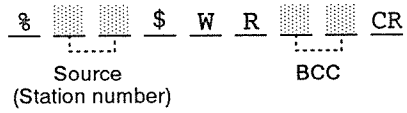
Outline Writes data into the system registers of the Programmable Controller(PC).

Basic message format

Command message



Response message

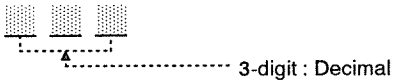


Description

- Data is written into the system registers of the Programmable Controller(PC).
- "0" must be always placed between the command code and the starting system register address.

Starting/ending system register addresses

- The starting and ending system register addresses are expressed using a form as shown below;

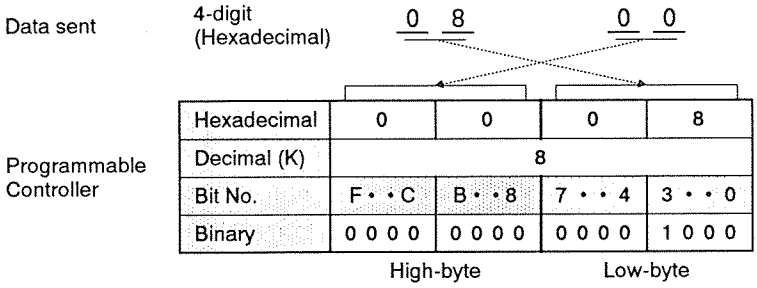


Note :

The ending system register address must be equal to or larger than the starting system register address.

Data sent

- 4 characters are needed for each system register data (one word per system register address) as shown below.
  Data will be sent to the Programmable Controller(PC) in order from the starting to the ending system register addresses.



Note :

Refer to page 117, "Table of FP3 System Registers", for detailed information of the system registers.

Program example

```
Command message
  % 0 1 # W R 0 0 0 5 0 0 7 C 8 0 0 C 8 0 0 3 C 0 0 * * CR

Response message
  % 0 1 $ W R 0 5 CR
```

The data are written into the system registers (numbers 5 to 7) of the Programmable Controller (PC) whose station number is 01.

Command message

Destination	: 01 station
Starting number	: System register 5
Ending number	: System register 7
Data sent	:C800(H),C800(H),3C00(H)
Actual data in Programmable Controller	: System register 5 = 00C8(H), System register 6 = 00C8(H), System register 7 = 003C(H)

Data sent — 4-digit (Hexadecimal): C 8 0 0

Programmable Controller System register 5

Hexadecimal	0	0	C	8
Decimal (K)	200			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	1 1 0 0	1 0 0 0

Response data — 4-digit (Hexadecimal): C 8 0 0

Programmable Controller System register 6

Hexadecimal	0	0	C	8
Decimal (K)	200			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	1 1 0 0	1 0 0 0

Response data — 4-digit (Hexadecimal): 3 C 0 0

Programmable Controller System register 7

Hexadecimal	0	0	3	C
Decimal (K)	60			
Bit No.	15 • • 12	11 • • 8	7 • • 4	3 • • 0
Binary	0 0 0 0	0 0 0 0	0 0 1 1	1 1 0 0

Response message

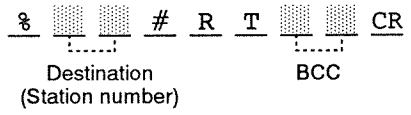
Source	: 01 station

RT Read the status of the Programmable Controller (PC)

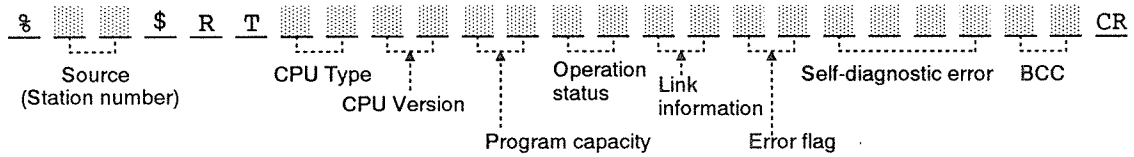
Outline Reads the status of the Programmable Controller(PC).

Basic message format

Command message



Response message



Description

- Reads the status of the Programmable Controller(PC).
- The type of Programmable Controller(PC), program capacity, operation mode and error flag status can be read with "RT" command.

CPU Type

- The type of CPU which is controlling the C-NET Link Unit, whose station number is specified in the command message, will be returned using 2 characters as shown below ;

Code	Specifications
03	FP3 Ladder Type CPU(10k program capacity type) or FP3 BASIC Type CPU
13	FP3 Ladder Type CPU(16k program capacity type)

CPU version

- The version of the CPU which is controlling the C-NET Link Unit, whose station number is specified in the command message, will be returned using 2 characters as shown below ;

Code	Specifications
10	Version 1.0
11	Version 1.1
12	Version 1.2
•	•
•	•
35	Version 3.5
•	•
•	•

Program capacity

- The program capacity will be returned using 2 characters as shown below ;

Capacity code	Program capacity setting	Actual program capacity (steps)
02	2k	1534
04	4k	3582
06	6k	5630
08	8k	7678
10	10k	9726
12	12k	11774
14	14k	13822
16	16k	15870

Notes :

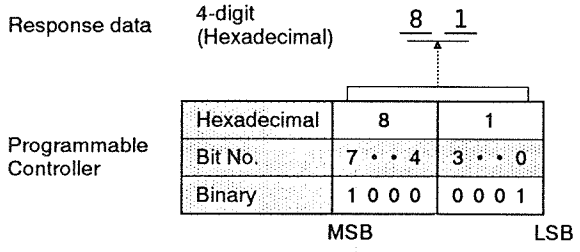
- Program capacity is set in the even numbers.
- The actual program capacity can be calcurated as ;
  1024 x (Setting No.) - 512 - 2

Operation status

- The operation status is expressed as a 2-digit hexadecimal number.
  The contents of the operation status are the same as the data in the special relays (R9020 to R9027).
- How to look up the operation status

Response data (Hex)	Bit No.	Specifications	Contents
Lower digit	0th LSB	Operation mode setting flag (R9020)	0 : In PROG. mode 1 : In RUN mode
	1st	Test run mode condition flag (R9021)	0 : Not in TEST run mode 1 : In TEST run mode
	2nd	Break execution flag (R9022)	0 : Break not executing 1 : Break executing
	3rd	Break condition flag (R9023)	0 : Break is in invalid condition 1 : Break is valid in TEST RUN mode
Upper digit	4th	Output enable / disable condition flag in the TEST RUN mode (R9024)	0 : Output disabled 1 : Output enabled in TEST RUN mode
	5th	Step run condition (R9025)	0 : Not in step run mode 1 : In step run mode
	6th	Message instruction [F149 (MSG) / P149 (PMSG)] flag (R9026)	0 : Message instruction not executing 1 : Message instruction executing
	7th MSB	Remote mode set flag (R9027)	0 : Not in REMOTE mode 1 : In REMOTE mode

Example : Response data ; "81"



Link information

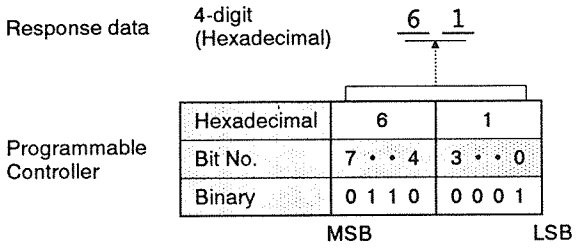
- Link information is returned using 2 characters. However, as this information is meaningless for reading the status of the Programmable Controller(PC), ignore this information.

Error flags (R9000 to R9007)

- The status of 8 error flags will be returned using 2 characters.
- How to look up the status of the error flags

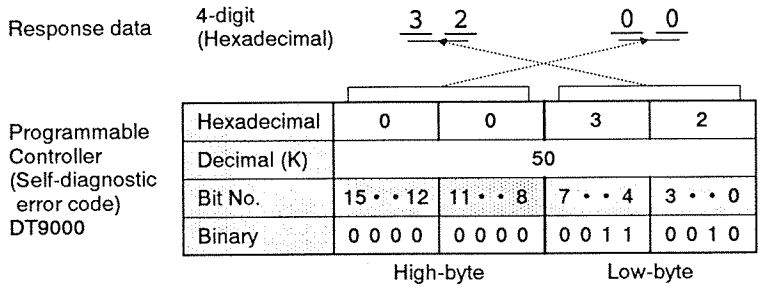
Response data (Hex)	Bit No.	Specifications	Contents
Lower digit	0th LSB	Self-diagnostic error flag (R9000)	0 : Self-diagnostic error has not occurred 1 : Self-diagnostic error occrred
	1st	Voltage dip detection flag (R9001)	0 : Voltage dip not detected 1 : Voltage dip detected
	2nd	Fuse blow detection flag (R9002)	0 : Fuse blow not detected 1 : Fuse blow detected
	3rd	Advance unit error flag (R9003)	0 : Advanced unit error not detected 1 : Advanced unit error detected
Upper digit	4th	I/O verify error flag (R9004)	0 : I/O verify error not detected 1 : I/O verify error detected
	5th	Battery valtage drop detection flag (Momentary flag) (R9005)	0 : No battery voltage drop detected 1 : Battery voltage drop detected
	6th	Battery voltage drop detection flag (Hold type flag) (R9006)	0 : No battery voltage drop detected 1 : Battery voltage drop detected
	7th MSB	Operation error flag (Momentary flag) (R9007)	0 : Operation error not detected 1 : Operation error detected

Example : Response data ; "61"



Self-diagnostic error (DT9000)

- The self-diagnostic error code is read out from the Programmable Controller(PC). The content of the self-diagnostic error code is same as the data in the DT9000. Refer to the selfdiagnostic error list regarding the error code. The specifications of the self-diagnostic error code is ;



Note :

- Refer to page 115, "Table of Self-diagnostic Error".

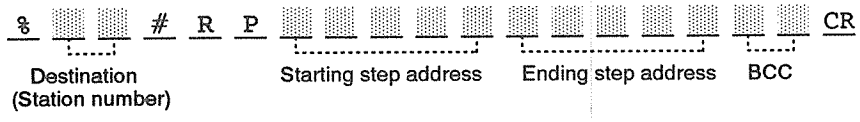
RP Read a program stored in the Programmable Controller (PC)

Outline

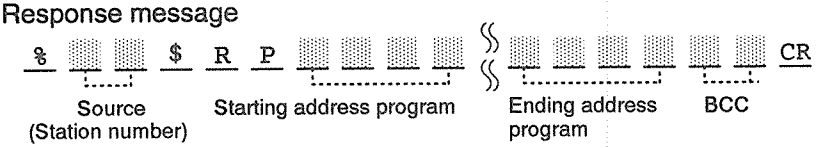
Reads a program stored in the Programmable Controller (PC).
This command is available only for program backup purposes.

Basic message format

Command message



Response message

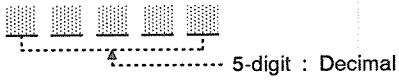


Description

- The program from the specified address is returned by the Progarmmable Controller(PC).
- This command should be used to save the program block only for backup purposes.

Starting step address/Ending step address

- Starting and ending stop addresses for the program are expressed as 5-digit decimal numbers as shown below;



Note :

The ending step address must be equal to or larger than the starting step address.

Program

- Each program step will be returned as 4 characters.

Note :

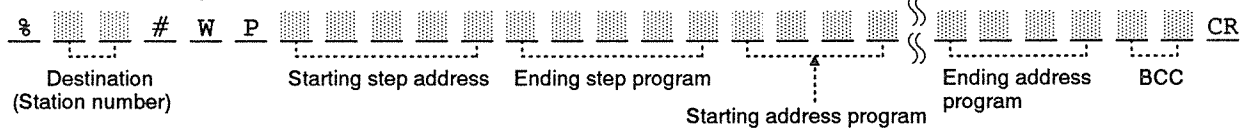
- To avoid malfunctions in the Programmable Controller, it is recommended that you do not modify or review the program that is read out.

WP Write a program which was saved by using the "RP" command back into the Programmable Controller (PC)

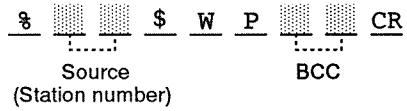
Outline Writes the program saved with the "RP" command back into the Programmable Controller (PC).
This command is available only for program uploading purposes.

Basic message format

Command message



Response message

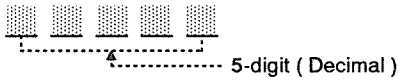


Description

- A program which was saved using the "RP" command is written back into the Progarmmable Controller (PC).
- This command should be used only for uploading a program block saved by using the "RP" command.

Starting step address/Ending step address

- Starting and ending step addresses for the program are expressed using a 5-digit decimal as shown below;



Note :

The ending step address must be equal to or larger than the starting step address.

Program

- Each program step will require 4 characters to be written back into the Programmable Controller.

Note :

The program which is uploaded must be a program which was saved using the "RP" command.
If you modify or revise the program, a malfunction may occur.

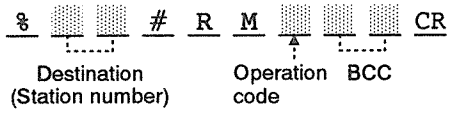
RM Remote control operation mode

Outline

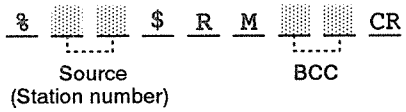
Remotely controls the operation mode.
The operation mode is remotely set to the RUN or PROG. mode.

Basic message format

Command message



Response message



Description

- Controls the operation mode.
  The operation mode is remotely set to the RUN or PROG. mode.

Note :

- The "RM" command is only valid when the Programmable Controller (PC) is set to REMOTE mode.
  For details, refer to the FP3 Hardware manual.

Operation code

Operation code	Specifications
R	PROG. mode → RUN mode
P	RUN mode → PROG. mode

Program example

Command message

```
% 0 1 # R M R * *CR
```

Response message

```
% 0 1 $ R M 1 F CR
```

The opetation mode of the Programmable Controller (PC), whose station number is 01, is set to the RUN mode.

Command message
Destination : 01 station
Data sent : PROG. mode -> RUN mode

Response message
Source : 01 station

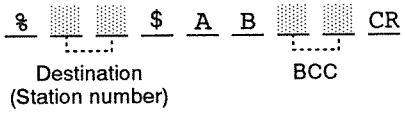
AB Abort a series of response messages

Outline

Aborts a series of messages.
This command is used to abort the reception of a response message sent in multiple frames.

Basic message format

Command message



Response message

No response message

Description

- This command cancells a message being sent in multiple frames. The cancellation occurs in the middle of the communication, when you want to stop receiving the response message for any reason.

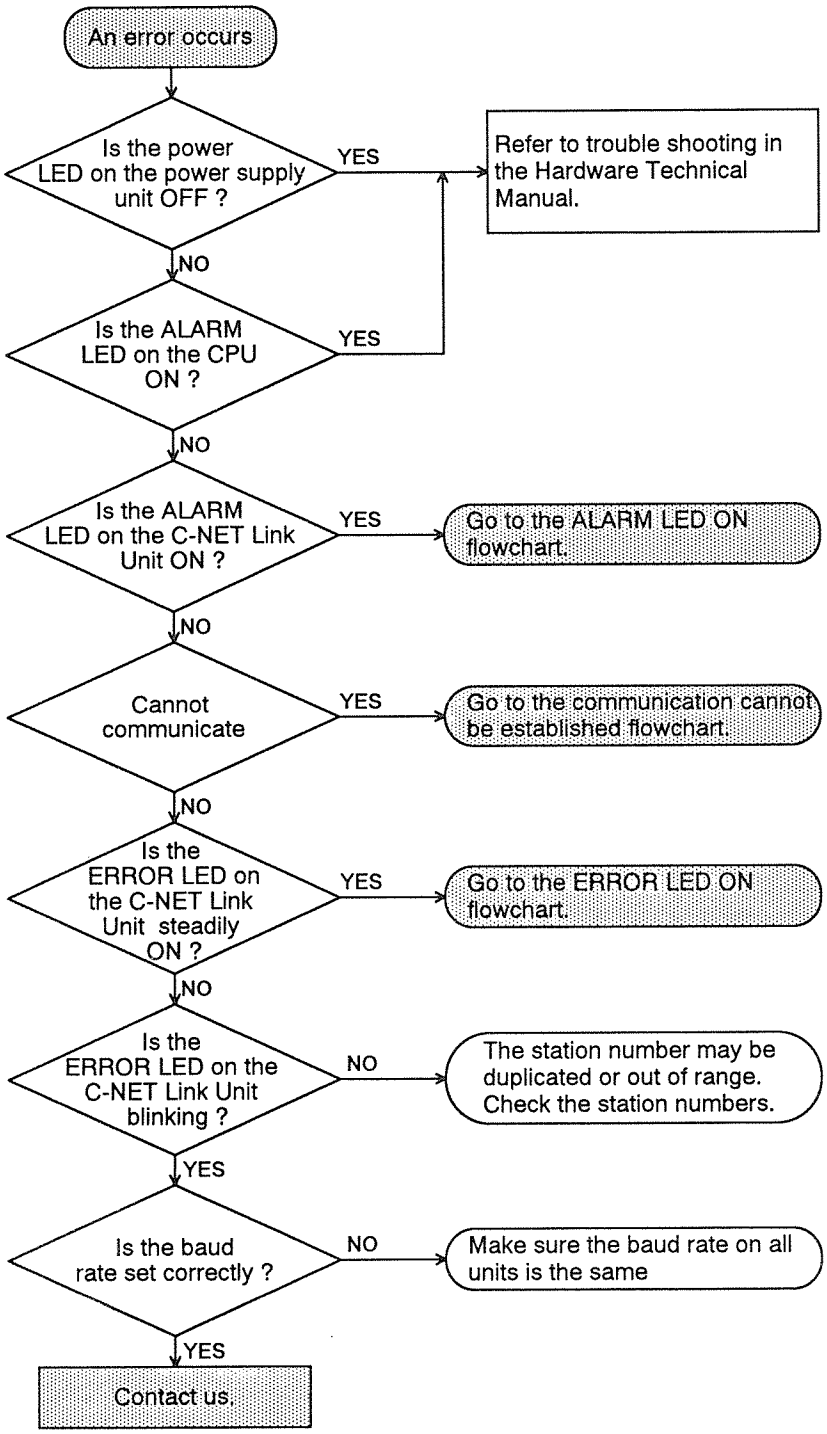
CHAPTER 7

TROUBLE SHOOTING

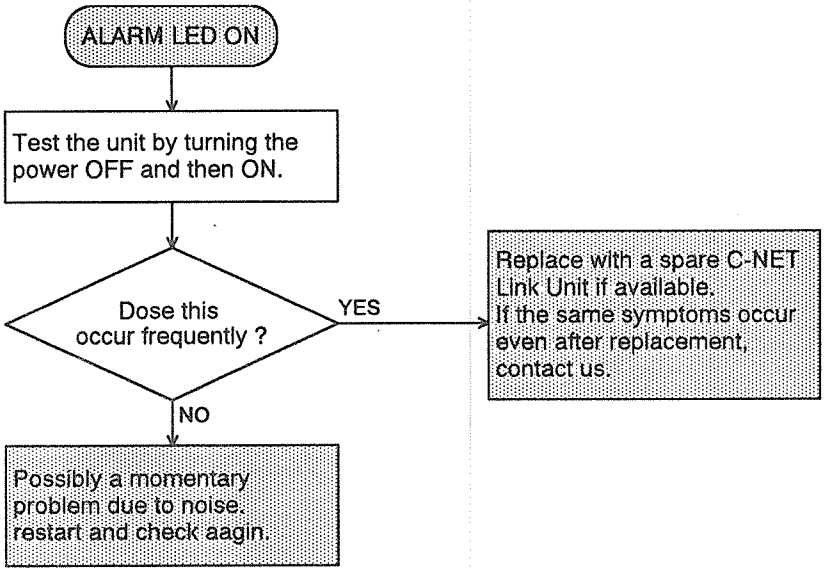
"PC" is an abbreviation of Programmable Controller.

7-1. Error Flowchart

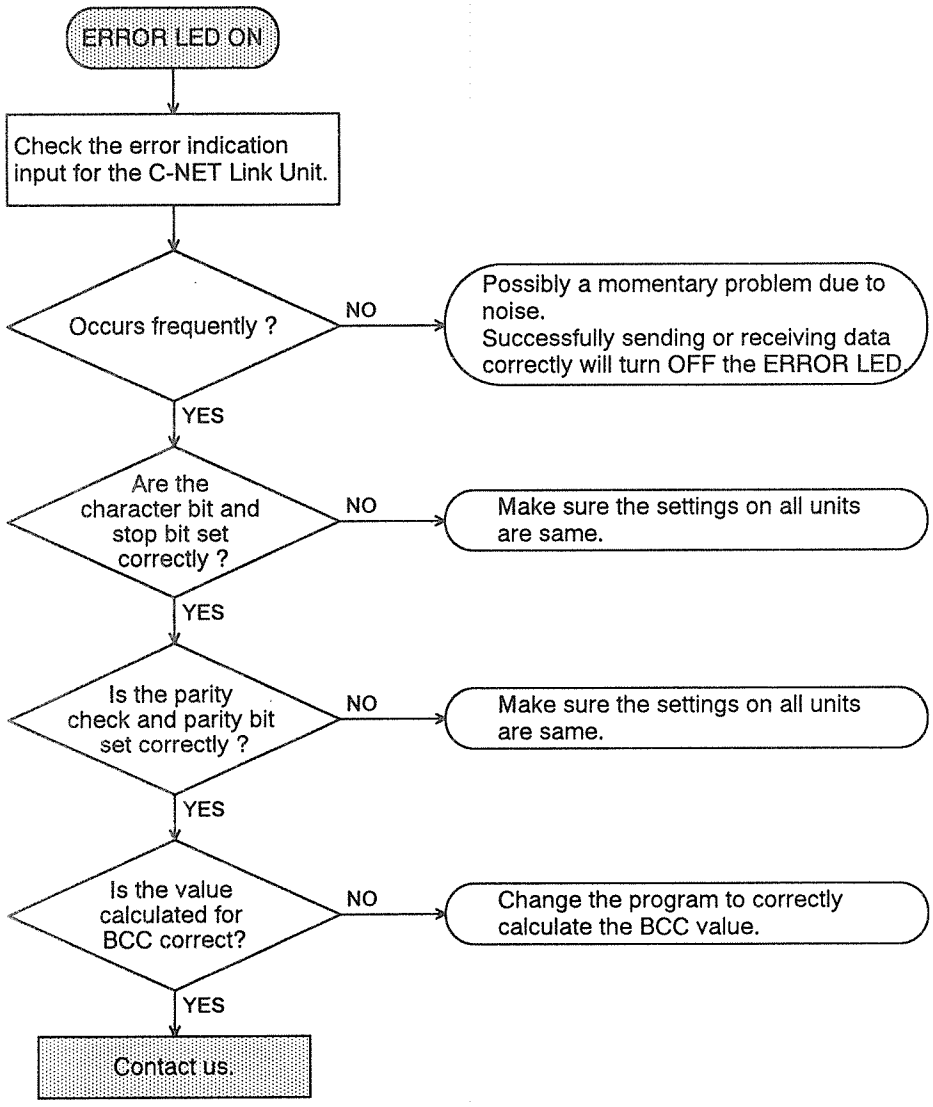
Mian Flowchart



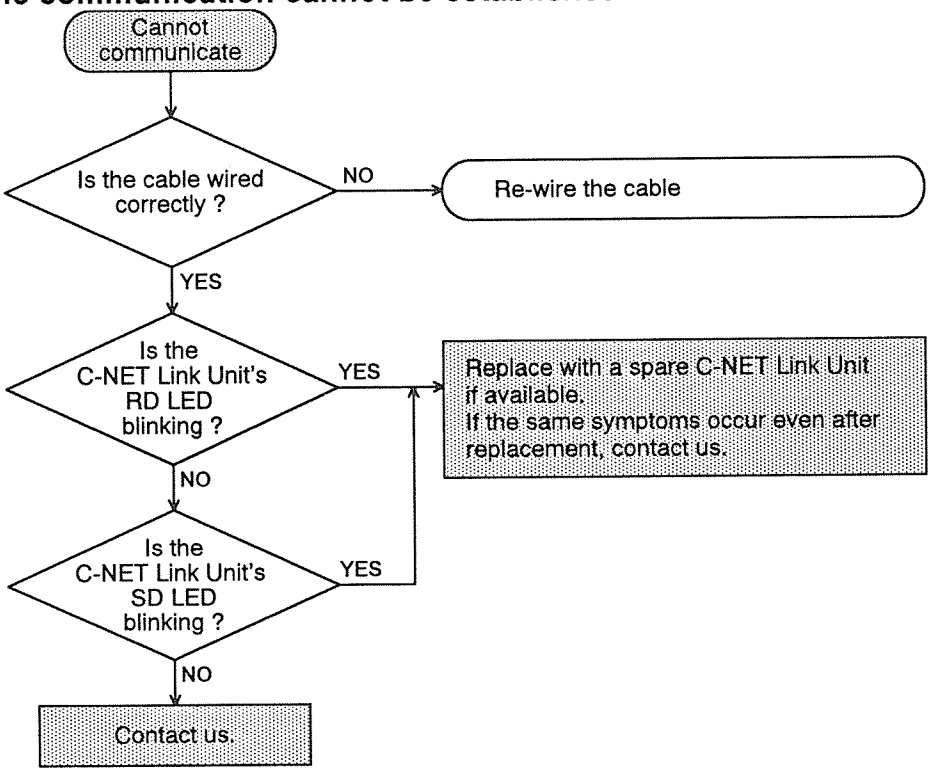
When the ALARM LED is ON.



When the ERROR LED is ON.



When the communication cannot be established.



CHAPTER 8

APPENDIX

"PC" is an abbreviation of Programmable Controller.

8-1. Table of Command/Response Codes

Command/ Response code (ASCII HEX code)	Functions	Available memory area	Memory area code in MEWTOCOL-COM
Relay Basic Commands			
RC (52)(43)	Reads the contents stored in external input relays, external output relays, internal relays link relays and timer or counter contacts. A computer can read a single bit of data, or an optional number of bits(1 to 8 bits) in one command message. It can also read data in units of words(one word=16 bits).	External input relay External output relay Internal relay Timer contact Counter contact Link relay	X Y R T C L
WC (57)(43)	Writes data into external output relays, internal relays link relays and timer or counter contacts. A computer can write a single bit of data or an, optional number of bits data (1 to 8 bits) in one command message. It can also write data in units of words(one word=16 bits).	External output relay Internal relay Timer contact Counter contact Link relay	Y R T C L X ※
SC (53)(43)	Set a data pattern in external output relays, internal relays or link relays. The data pattern is written in units of words(one word=16 bits).	External output relay Internal relay Link relay	Y R L X ※
Register Basic Commands			
RD (52)(44)	Reads the contents stored in data registers, link data registers, file registers or index registers(IX or/and IY). As the memory area is configured as 16 bits, a piece of data will be returned as a 4-digit hexadecimal number(in ASCII format).	Data register Link data register File register Index register IX Index register IY Index register IX & IY	D L F IX IY ID
WD (57)(44)	Writes data into data registers, link data registers, file registers or index registers(IX or/and IY). As the memory area is configured as 16 bits, the data to be written into is specified as a 4-digit hexadecimal number(in ASCII format).	Data register Link data register File register Index register IX Index register IY Index register IX & IY	D L F IX IY ID
SD (53)(44)	Sets a data pattern in data registers, link data registers or file registers. As the memory area is configured as 16 bits, the data is specified as a 4-digit hexadecimal number(in ASCII format).	Data register Link data register File register	D L F
Timer/Counter Set(Preset)/Elapsed(Count) Value Commands			
RS (52)(53)	Reads the Timer/Counter Set(Preset) Value stored in the Set(Preset) Value area.	Set(Preset) Value area	No need to specify the memory area code.
WS (57)(53)	Writes data into the TImer/Counter Set(Preset) value area in the Programmable Controller(PC).	Set(Preset) Value area	No need to specify the memory area code.
RK (52)(4B)	Reads the Timer/Counter Elapsed(Count) Value stored in the Elapsed (Count) Value area.	Elapsed(Count) Value area	No need to specify the memory area code.
WK (57)(4B)	Writes data into the Timer/Counter Elapsed(Count) Value area in the Programmable Controller(PC).	Elapsed(Count) Value area	No need to specify the memory area code.

Monitor Commands			
MC (4D)(43)	Specifies the address of external input relays, external output relays, internal relays, link relays and t imer or counter contacts which will be monitored. Resets the points specified by previous "MC" commands.	External input relay External output relay Internal relay Timer contact Counter contact	X Y R T C
MD (4D)(44)	Specified the addresses of external input relays (word units), external output relays (word units), intenal relays (word units), link relays (word units), data registers, link data registers, file registers, index registers(IX or IY) or Timer/Counter Set/Elapsed value which will be monitored. Resets the points specified by previous "MD".	Data register Link data register File register Set(Preset) Value area Elapsed(Count) Value area Index register IX Index register IY Word external input relay Word external output relay Word internal relay	D L F S K IX IY WX WY WR
MG (4D)(47)	Monitors the points specified in "MC" and "MD" commands.	Specified in "MC" and "MD"commands.	No need to specify the memory area code.
System Register Commands			
RR (52)(52)	Reads the contents stored in system registers of the Programmable Controller(PC).	System registers	No need to specify the memory area code.
WR (57)(52)	Writes data into the system registers of Programmable Controller(PC).	System registers	No need to specify the memory area code.
Status Commands			
RT (52)(54)	Reads the status of the Programmable Controller(PC). The Programmable Controller type, program capacity,	Status of the Programmable Controller	No need to specify the memory area code.
Program Commands			
RP (52)(50)	Reads a program stored in the Programmable Controller(PC). Use this command only for a program backup.	Program	No need to specify the memory area code.
WP (57)(50)	Writes the program saved with the "RP" command back into the Programmable Controller(PC). Use this command only for uploading program.	Program	No need to specify the memory area code.
Remote Control Command			
RM (52)(4D)	Remotely controls the operation mode. The operation mode is remotely set to RUN or PROG. mode.	Operation mode.	No need to specify the memory area code.
Control Command			
AB (41)(42)	Aborts a series of messages. Used to abort receiving a response message sent in multiple	————	No need to specify the memory area code.

Note :

- The memory area code with the ※ mark are available only for the FP3.

8-2. Table of Error Codes

① Link system error

Error code (Hexadecimal)	Error code (Decimal)	Contents	Description	
15(H)	21	NACK error	• The setting of the data communication (data bit / parity bit / stop bit etc.) is sent to the C-NET Link Unit in differnt format.	• Check the format of communication setting. • Check the connection of the cables and environmental noise level.
16H)	22	WACK error	• In one command frame, two or more geaders (%) or terminators (CR) are recognized at the C-NET Link Unit.	• Check the frame format of the command messages. • Check the connection of the cables and environmental nose level.
1B(H)	27	Not support error	• 119 or more characters are sent to the C-NET Link Unit in one command frame.	• Check the number of characters in one frame.

② Basic error

Error code (Hexadecimal)	Error code (Decimal)	Contents	Description	
28(H)	40	BCC error	• BCC error occurs.	• Check the connection of the cables and environmental noise level.
29(H)	41	Format error	• The command message does not match the MEWTOCOL format.	• Check the command message. (Header / Station No. / Command marker etc.)
2A(H)	42	Not support error	• The command message is sent to not available station. • The command is not supported, etc.	• Check the station No., command and numbers of data specification fam.
2B(H)	43	Procedure error	• Another series of message is sent to the Programmable Controller when a series of message in multiple frames is going.	• Change a program so that another series of message is not sent to the Programmable Controller while one message in multiple frames are not completed.

③ Processing error

Error code (Hexadecimal)	Error code (Decimal)	Contents	Description	
35(H)	53	Busy error	• Another command message is sent to the Programmable Controller (PC) through another link unit (C-NET Link Unit / Link Unit / C.C.U.), when a series of message is going.	• Change a program so that two or more messages are sent to one Programmable Controller simultaneously.

④ Application error

Error code (Hexadecimal)	Error code (Decimal)	Contents	Description	
3C(H)	60	Parameter	• The specified data or data area code is not available.	• Check the data or data area code.
3D(H)	61	Data error	• The specified data or data area is not available.	• Check the data or data area numbering.
3E(H)	62	Registration error	• The specified data or data area to be monitored or traced are not registered. • The registered data or data area is beyond the limit.	• Check the registration status of the data or data area to be monitored or traced.
3F(H)	63	Programmable Controller (PC) mode error	• The remote mode setting operation is performed when the mode set switch is not set in Remote mode.	• Set the mode set switch to the Remote mode.
41(H)	65	Protect error	• "Write" command message is sent to the Programmable Controller, when the program is in protect enabled (program masked) condition.	• Open the protect.
42(H)	66	Address	• THe specified address is not available.	• Check the address.
43(H)	67	No data error	• There is no comment registration to be read out.	• Register the comment.

8-3. Table of Self-diagnostic Error

If a self-diagnostic error occurs, the ERROR LED on the CPU turns ON.
The error code for the specific self-diagnostic error is expressed in 2-digit hexadecimal number in the response message.

Error code (Hexadecimal)	Error code (Decimal)	Contents	CPU operation	Corrective Action
14(H)	20	BPU error	Halt	Please contact us.
15(H)	21	RAM error 1	Halt	Please contact us.
16(H)	22	RAM error 2	Halt	Please contact us.
17(H)	23	RAM error 3	Halt	Please contact us.
18(H)	24	RAM error 4	Halt	Please contact us.
19(H)	25	RAM error 5	Halt	Please contact us.
1A(H)	26	User's ROM checksum error	Halt	Check the data in the ROM.
1B(H)	27	The advanced unit number is over the limit	Halt	Reduce the number of advanced units.
1C(H)	28	System register error	Halt	Contents of system register are wrong. Set correct value sfor the system registers.
1D(H)	29	System bus time-out	Halt	Please contact us.
1E(H)	30	Interrupt error 0	Halt	Please contact us.
1F(H)	31	Interrupt error 1	Halt	It could be a hardware error in the unit or malfunction due to the electrical noise. Check the unit and the environmental noise level.
20(H)	32	Interrupt error 2	Halt	Create a program will respond to this interrupt.
22(H)	34	I/O unit access error for Remote I/O System	Halt	An access error occured in a slave station. Replace the unit which caused the error. Refer to DT9131 to DT9137.
23(H)	35	An illegal unit is installed as a slave station in the Remote I/O System	Halt	Remove the illegal unit.
24(H)	36	The Remote I/O usage limit was exceeded	Halt	Observe the usage limits. (number of slots, number of I/O points, etc.).
25(H)	37	Remote I/O map overlap or range overflow error	Halt	Reset the I/O map so that it does not have any overlaps.
26(H)	38	I/O Terminal Board registration error	Halt	Enter the correct registration value in the I/O map for the I/O Terminal Board.
29(H)	41	Advanced unit is hungup	Selection	Refer to the manual for the advanced unit and check its operation.

Error code (Hexa decimal)	Error code (Decimal)	Contents		CPU operation	Corrective Action
2A(H)	42	I/O verification error		Selection	The current connection of I/O unit is different from the initial state. Check the connection status of the I/O unit.
2D(H)	45	Operation error		Selection	Check the instruction that caused the error.
2E(H)	46	Remote I/O transmission error (see Note 1.)		Selection (see Note 2.)	Check the power supply for the slave station or the transmission line.
2F(H)	47	I/O attribute error in the slave station (verification error, blown fuse, advanced unit error) (see Note 1.)		Selection (see Note 2.)	Perform the check for the unit.
32(H)	50	Battery error		Run	The battery voltage has dropped. Replace the battery with a new one.
33(H)	51	Remote I/O terminal station error		Run	The setting of the Remote I/O terminal station for is incorrect. Reset the terminal station I/O settings.
34(H)	52	Remote I/O synchronous update error		Run	Please contact us.
64(H) to 12B(H)	100 to 299	Error warning instruction	100 to 199	Halt	A high level instruction has encountered a self-diagnostic error (F148).
			200 to 299	Run	

Notes :

1. Refer to the " Remote I/O System Tecnical Manual " for the method to check faulty slave stations.
2. The CPU operation can be set to stop or continue when an error occurs by the way the system register is set. For details, refer to the " Remote I/O System Tecmical Manual ".

8-4. Table of FP3 System Registers

Address No.	Description	Default value	Settable range
Memory Allocation			
0	Sequence program memory size (See note 1. in the next page)	8	FP3 : 2 to 10k words
1	Machine language program memory size (See note 1. on the next page)	0	FP3 : 0 to 8k words
2	Comment memory size	3	Use default value " 3 ".
3 4	Unused Unused	——— ———	——— ———
Internal I/O Setting			
5	Counter start No. setting(See note 2.)	200	0 to 256
6	Timer/Counter hold area start No. setting (See note 2. in the next page)	200	0 to 256
7	Internal relay hold area start No. setting (See note 3. in the next page)	60	0 to 98
8	Data register hold area start No. setting (See note 3. in the next page)	0	0 to 2,048
9	File register hold area start No. setting (See note 3. in the next page)	0	0 to 22,525
10	Link relay hold area setting for Link 0 (See note 3. in the next page)	0	0 to 64
11	Link relay hold area setting for Link 1 (See note 3. in the next page)	64	64 to 128
12	Link register hold area setting for Link 0 (See note 3. in the next page)	0	0 to 128
13	Link register hold area setting for Link 1 (See note 3. in the next page)	128	128 to 256
14	Step ladder hold/non-hold setting	1 (Non-hold)	0 : Hold, 1 : Non-hold
15	Data output hold/non-hold setting	0 (Non-hold)	0 : Non-hold, 1 : Hold
16 to 19	Unused		
RUN Mode During an Error			
20	Duplicate output	0 (Disable)	0 : Output disable 1 : Output enable
21	Output unit fuse blow	0 (Stop)	0 : Stop 1 : Continue
22	Advanced unit error	0 (Stop)	
23	I/O verification error	0 (Stop)	
24	Watchdog timer time out (This register No. is only used by the FP5)	0 (Stop)	0 : Stop, 1 : Continue Refer to system register No.30
25	Unused	———	———
26	Operation error	0 (Stop)	0 : Stop 1 : Continue
27	Remote I/O slave link error	0 (Stop)	
28	I/O error in the Remote I/O slave station	0 (Stop)	
29	Unused	———	———
Wait Time Setting			
30	Watchdog timer's time-out value (This register no. is only by the used FP5)	120(300 ms)	4 to 256(10 ms to 640 ms)
31	Time setting for managing multiple frames	2,600(6.5s)	4 to 32,760(10 ms to 81.9 s)
32	Data transfer's wait times setting for F145(SEND) ,P145(PSEND)/ F146(RECV) ,P146(PRECV)instructions, F152(RMRD) ,P152(PRMRD)/ F153(RMWT) ,P153(PRMWT) instructions (See note 4.)	800(2.0 s)	4 to 32,760(10 ms to 81.9 s)
33	Assignment time oforblock change in the RUN mode	5,000(10 ms)	1,000 to 65,535 (2,000 to 131,070 μs)

Address No.	Description		Default value	Settable range
Remote I/O Operating Mode Setting				
35	Confirmation for connection of a slave station		1 (Set)	0 : Release 1 : Set
36	Selection of Remote I/O update method		0	0 : Synchronous 1 : Asynchronous
Setting for Link 0				
40	Link relay memory size		0	0 to 64 words (0 to 1,024 points)
41	Link register memory size		0	0 to 128 words
42	Link relay send memory size	Start words No.	0	0 to 63
43		number of words to send	0	0 to 64 words
44	Link register send memory size	Start words No.	0	0 to 127
45		number of words to send	0	0 to 127 words
46 to 49	Unused		–	–
Setting for Link 1				
50	Link relay memory size		0	0 to 64 words (0 to 1,024 points)
51	Link register memory size		0	0 to 128 words
52	Link relay send memory size	Start words No.	64	64 to 127
53		number of words to send	0	0 to 64 words
54	Link register send memory size	Start words No.	128	128 to 255
55		number of words to send	0	0 to 127 words
56 to 59	Unused		–	–

Notes :

1. The total maximum of sequence program area size and machine language program areasize is 10 K words for FP3.
2. The value of address No.5 and 6 must be same. The Predet (Set) value area (SV) and the Count (Elapsed) of value area (EV) are also Hold / Non-hokd according to the set value of No.6.
3. Each holding area is divided by the word no. you set. The area from 0 to the number is Non-hold, and from the number to the end is Hold. To set the whole area hold, input the word no. which is 1 large tha the maximum.
4. Set the address No. 30 to 32 as below:
   Set time=Set value × 2.5ms(Set Valu is decimal.)
   The default value are set as below:
   Address No.30...default value: 120 (set time: 300 ms)
   Address No.31...default value: 2600 (set time: 6.5 s)
   Address No.32...default value: 800 (set time: 2.0 s)
5. Set the address No. 33 as below:
   Set time=Set value × 2.0 μs(Set Valu is decimal.)
   The default value: 5000(set time: 10 ms)
6. The terms "Hold" and "Non-hold" are specified as;
   - Hold area : the memory area whose contents are not lost or disturbed if the operating power is lost.
   - Non-hold area : the memory area whose contents are lost or disturbed if the operating power is lost.

8-5. Table of FP3 Operands

1. Organized by Processing Size

Processing unit	Name	Symbol	Numbering
Bit	External input relay	X	X0 to X127F (= WX0 to WX127)
	External output relay	Y	Y0 to Y127F (= WY0 to WY127)
	Internal relay	R	R0 to R97F (= WR0 to WR97)
	Special internal relay	R	R9000 to R910F (= WR900 to WR910)
	Link relay	L	L0 to L127F (WL0 to WL127)
	Timer contact	T	T0 to T255 ┐
	Counter contact	C	C0 to C255 ┘ Common numbers
Word	Word external input relay	WX	WX0 to WX127 (= X0 to X127F)
	Word external output relay	WY	WY0 to WY127 (= Y0 to Y127F)
	Word internal relay	WR	WR0 to WR97 (= R0 to R97F)
	Word special internal relay	WR	WR900 to WR910 (= R9000 to R910F)
	Word link relay	WL	WL0 to WL127 (= L0 to L127F)
	Data register	DT	DT0 to DT2047
	Special data register	DT	DT9000 to DT9255
	Link data register	LD	LD0 to LD255
	File register	FL	FL0 to FL8188
	Index register IX	IX	] One word each (No numberings system)
	Index register IY	IY	
	Timer/Counter Set(Preset) value	SV	SV0 to SV255
	Timer/Counter Elapsed(Count) value	EV	EV0 to EV255
	Word decimal constant	K	K-32768 to K32767
	Word hexadecimal constant	H	H0 to HFFFF
Double word	Double word decimal constant	K	K-2147483648 to K2147483647
	Double word hexadecimal constant	H	H0 to HFFFFFFFF
12 Characters	Character constant	M	None

Notes :

Explanation of basic terminology

- Bit : One binary digit. The smallest unit of binary information. A bit can express a value of "1" or "0".
- Word : A word is composed of 16 bits which are operated on simultaneously when a computer is performing an instruction. Word addresses are expressed as decimal numbers.
- Relay bit address : Address for relay bits(X, Y, R and L) are expressed as a combination of a word address(decimal) and hexadecimal. The least significant digit is hexadecimal and the rest of the digits are decimal.

Example X 3 8 F

- F — Hexadecimal(Bit number)
- 38 — Decimal(Word number)

2. Organized by Function

Functions	Name	Symbol (unit)	Numbering
External Input/ Output Relays	External input relay	X/ WX (bit/word)	X0 to X127F(bit)/WX0 to WX127 (word)
	External output relay	Y/ WY (bit/word)	Y0 to Y127F(bit)/WY0 to WY127 (word)
Internal Relays	Internal relay	R/ WR (bit/word)	R0 to R97F(bit)/WR0 to WR97(word)
	Special internal relay	R/ WR (bit/word)	R9000 to R910F(bit)/WR9000 to WR910(word)
Link area	Link relay	L/ WL (bit/word)	L0 to L127F(bit)/WL0 to WL127 (word)
	Link data register	LD (word)	LD0 to LD255
Data area	Data register	DT (word)	DT0 to DT2047
	Special data register	DT (word)	DT9000 to DT9255
	File register	FL (word)	FL0 to FL8188
Index modifier	Index register IX	IX (word)	One word each (No numberings system)
	Index register IY	IY (word)	
Timer/ Counter	Timer contact	T (bit)	T0 to T255 — Common numbers
	Counter contact	C (bit)	C0 to C255 — Common numbers
	Timer/Counter Set(Preset) value	SV (word)	SV0 to SV255
	Timer/Counter Elapsed(Count) value	EV (word)	EV0 to EV255
Constant	Decimal constant (word unit)	K	K-32768 to K32767(word)
	Decimal constant (double word unit)	K	K-2147483648 to K2147483647(double word)
	Hexadecimal constant (word unit)	H	H0 to HFFFF(word)
	Hexadecimal constant (double word unit)	H	H0 to HFFFFFFFF(double word)
Character	Character constant	M	None

8-6. ASCII CODE (7-bit ASCII Codes)

b_7	b_6	b_5	b_4	b_3	b_2	b_1	Most significant digit / Least significant digit	0	1	2	3	4	5	6	7
			0	0	0	0	0	NUL	DLE	SPACE	0	@	P	`	p
			0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
			0	0	1	0	2	STX	DC2	"	2	B	R	b	r
			0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
			0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
			0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
			0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
			0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
			1	0	0	0	8	BS	CAN	(	8	H	X	h	x
			1	0	0	1	9	HT	EM	)	9	I	Y	i	y
			1	0	1	0	A	LF	SUB	*	:	J	Z	j	z
			1	0	1	1	B	VT	ESC	+	;	K	[	k	{
			1	1	0	0	C	FF	FS	,	<	L	\	l	|
			1	1	0	1	D	CR	GS	-	=	M	]	m	}
			1	1	1	0	E	SO	RS	.	>	N	^	n	~
			1	1	1	1	F	SI	US	/	?	O	_	o	DEL

8-7. Product types

CPU

Types	Part No.	Specifications
10k-step capacity program	AFP3210	ROM / RAM operation
	AFP3211	ROM / RAM operation with comment and trace functions
	AFP3212	ROM operation

Memory

Types	Part No.	Specifications
EPROM 2 pcs as a set	AFP5202	EPROM (27C256 or equivalent)

Power Supply Unit

Types	Part No.	Specifications
100 V AC to 120 V AC, 200 V AC to 240 V AC	AFP3631	Unit power supply : 5 V DC, 2.4 A External power supply : 24 V DC, 0.8 A
24 V DC	AFP3634	Unit power supply : 5 V DC, 2.4 A
Dummy Unit	AFP3639	———

Master Backplane

Types	Part No.	Specifications
3-slot type	AFP3505	In addition to the CPU and the Power Supply Unit, 3 additional slots are available
5-slot type	AFP3501	In addition to the CPU and the Power Supply Unit, 5 additional slots are available
8-slot type	AFP3502	In addition to the CPU and the Power Supply Unit, 8 additional slots are available

Expansion Backplane

Types	Part No.	Specifications
3-slot type	AFP3506	In addition to the Power Supply Unit, 3 additional slots are available
5-slot type	AFP3503	In addition to the Power Supply Unit, 5 additional slots are available
8-slot type	AFP3504	In addition to the Power Supply Unit, 8 additional slots are available

Expansion Cable

Types	Part No.	Specifications
0.5 m / 1.640 ft.	AFP3510	Expansion cable between the Master and Expansion Backplane or between Expansion Backplanes.
1 m / 3.281 ft.	AFP3511	
3 m / 9.843 ft.	AFP3513	
10 m / 32.808 ft.	AFP35110	
15 m / 49.213 ft.	AFP35115	
25 m / 82.021 ft.	AFP35125	

Link Unit

Types	Part No.	Specifications
Link Unit	AFP3710	—

RS232C Link Unit

Types	Part No.	Specifications
RS232C Link Unit	AFP8760	—

C-NET Link Unit

Types	Part No.	Specifications
C-NET Link Unit	AFP3463	—

C-NET Adapter

Types	Part No.	Specifications
24 V DC type	AFP8532	RS485 ↔ RS422 / RS232C signal converter Used for communication between the Programmable Controller (PC) and the computer
100 V AC to 240 V AC type	AFP8536	

C.C.U. (Computer Communication Unit)

Types	Part No.	Specifications
C.C.U.	AFP3462	Used for communication between the Programmable Controller (PC) and the computer

RS422 / 232C Adapter

Types	Part No.	Specifications
RS422 / 232C Adapter	AFP8550	RS422 ↔ RS232C signal converter Used for comunication between the Programmable Controller (PC) and the computer

Programming Tools

Types	Part No.	Specifications
FP Programmer	AFP1112A	Handheld programming device for FP1 / FP3 / FP5. The Comment trace / Test run functions of the FP3 / FP5 are not available with the AFP1112A
FP ROM Writer	AFP5651	———
Memory (EPROM)	AFP5202	EPROM (27C256 or equivalent) 2 pcs as a set
Teaching Unit, F Type	AFP5132	Programming device, Positioning Unit F Type
NPST-GR program editing software	AFP266528	Program editing software to be used on personal computer (IBM PC-AT or 100 % compatible)

Cables

Types	Part No.	Specifications
FP Peripheral Cable (0.5m / 1.640 ft.)	AFP5520	Connects between the CPU and the programming tools (e.g. FP Programmer, Teaching Unit F Type, RS422 / 232C Adapter)
FP Peripheral Cable (3 m / 9.843 ft.)	AFP5523	
FP ROM Writer Power Cable	AFP8512	Connects between the FP ROM Writer and a commercially available power supply
RS232C Cable (3 m / 9.843 ft.)	AFB85833 AFB85853	Connects between the C.C.U. / C-NET Adapter and a personal computer (IBM PC-AT or 100 % compatible)
Fiber optic Cord	AFP4200***	*** : 001 to 100 length : 1 m to 100 m / 3.281 ft. to 328.084 ft. example AFP4200001 : 1 m / 3.281 ft. AFP4200010 : 10 m / 32.808 ft.
Fiber optic Cable	AFP4402***	*** : 001 to 800 length : 1 m to 800 m / 3.281 ft. to 2624.672 ft. example AFP4402010 : 10 m / 32.808 ft. AFP4402100 : 100 m / 328.084 ft.

RS232C Cable Wiring

AFB85833

Connected to C.C.U. / C-NET Adapter (9 Pins Male)

Pin No.	Abbrev.
1	FG
2	SD(TXD)
3	RD(RXD)
4	RS(RTS)
5	CS(CTS)
6	RI(CI)
7	SG
8	CD(DCD)
9	ER(DTR)

Connected to Computer (25 Pins Female)

Pin No.	Abbrev.
1	FG
2	SD(TXD)
3	RD(RXD)
4	RS(RTS)
5	CS(CTS)
6	DR(DSR)
7	SG
8	CD(DCD)
20	ER(DTR)

AFB85853

Connected to C.C.U. / C-NET Adapter (9 Pins Male)

Pin No.	Abbrev.
1	FG
2	SD(TXD)
3	RD(RXD)
4	RS(RTS)
5	CS(CTS)
6	RI(CI)
7	SG
8	CD(DCD)
9	ER(DTR)

Connected to IBM PC-AT (9 Pins Female)

Pin No.	Abbrev.
1	CD(DCD)
2	RD(RXD)
3	SD(TXD)
4	ER(DTR)
5	SG
6	DR(DCD)
7	RS(RTS)
8	CS(CTS)
9	RI(CI)

INDEX

P

R

S

T

W

RECORD OF CHANGES

ACG No.	Date	Description of Changes
ACG-M0031-1	NOV. 1992	First edition

These materials are printed on ECF pulp.
These materials are printed with earth-friendly vegetable-based (soybean oil) ink.

Please contact .....

Matsushita Electric Works, Ltd.

Automation Controls Company
■ Head Office: 1048, Kadoma, Kadoma-shi, Osaka 571-8686, Japan
■ Telephone: +81-6-6908-1050
■ Facsimile: +81-6-6908-5781

ACG-M0031-1 NOV. 92 8ZHo

Specifications are subject to change without notice.

Printed in Japan.