MITSUBISHI ELECTRIC

Numerical Protection Relay

MELPRO™-D Series

COMMUNICATION CARD (CC-Link)

MODEL

CC-COM

INSTRUCTION MANUAL (GENERAL INFORMATION)

Request

Ensure that this Instruction Manual is delivered to the end users and the maintenance manager.

● Safety Precautions ●

(Read the following before use)

Read this manual and the related manual books introduced in this book carefully before using this product. Exercise special care to ensure safety and observe the proper use of the product.
The precautions stated in this manual solely relate to this product. For the safety precautions of the sequencer system, see the CPU Unit User Manual and Master Unit User Manual.
In this manual, the safety precautions are classified into two different ranks: “DANGER” and “CAUTION”.

DANGER	This mark is indicated where, if you mishandle the product, there would arise the possibilities of causing a dangerous condition accompanied by death or major injury.
CAUTION	This mark is indicated where, if you mishandle the product, there would arise the possibilities of causing a dangerous condition accompanied by mid-level damage and/or minor injury or physical damages only.

Note that failing to observe a precaution item even with a CAUTION may result in a serious condition depending on situation.
Since any precaution texts indicate important information, always follow the instructions whichever mark is provided.
Keep this manual in a safe place for quick reference whenever you need. Also, please ensure that this manual is delivered to every end user.

[Design Precautions]

DANGER

- The output may remain on or off the Mitsubishi Electric MELPRO-D Series Protection Relay (hereinafter referred to as “MELPRO-D”) has failure.
  Provide an exterior circuit to detect output signals that may lead to a serious accident.
  Output error and malfunction may cause an accident.

- If communication error occurs (including unexpected coming-off of a cable), the communication between MELPRO-D and the master station will be interrupted to make the communication functions inoperable.
  When integrating MELPRO-D in your system, configure your system in such a manner that switching operations which are very important to the system will be given by other device, not MELPRO-D, on the assumption that MELPRO-D may have communication errors.
  Output error and malfunction may cause an accident.

- For what will happen to each station when the sequencer CPU stops computation or an update error occurs in the data link, refer to the chapter 5 “Data link processing time” in the Master Unit User Manual.
  Configure an interlock circuit on the sequence program using the communication status information as below mentioned so that the system can operate on the safety side.
  Output error and malfunction may cause an accident.
  -Data sent from the data link error station of the master and local stations:
  (1) Remote input (RX), Remote output (RY)

[Design Precautions]

CAUTION

- Do not bind communication cables together with the main circuit or power line. Also, do not install communication cables near the main circuit or power line. As a guideline, all the communication cables should be away from the main circuit and power line by at least 100 mm.
  Otherwise, noise may be generated to cause malfunction.
- In consideration of the case of communication becoming impossible by noise etc, if response cannot be found during a certain fixed time (10s), please clear transmitting information. It is necessary to notify then that it has not transmitted.
- The relay might do the restart processing by the noise etc. An abnormality of data link is generated while processing the restart. In this case, please install the timer of about one second for masking the abnormality of data link signal from the relay. MELPRO-D always observes an electric circuit and a built-in power supply. When abnormally generated, the operation output is locked, RUN display LED is turned off, and self-diagnosis signal is output. However, the relay tries the recovery of protection function by the restart processing which aims to prevent the output of self-diagnosis due to occur by the transient disturbance such as noise. The communication function stop time during restart processing is 300ms or less.
  The restart processing will be continued up to 2 times(600ms) in maximum. Therefore, please take a margin for setting of timer such like 1 second.

[Installation Precautions]

DANGER

- When installing or removing MELPRO-D on or from the board, be sure to shut off the power supply of MELPRO-D from the outside before installation or removal. Otherwise, the unit may have failure or malfunction.
- When attaching or detaching a CC-COM communication card for MELPRO-D (hereinafter referred to as “CC-COM”) to or from MELPRO-D, be sure to shut off the power supply of MELPRO-D from the outside before installation or removal. Otherwise, the unit may have failure or malfunction.
- When connecting a communication cable to MELPRO-D, shut off the power supply on the sides of MELPRO-D and sequencer CPU from the outside before connection. Otherwise, the unit may have failure or malfunction.

CAUTION

- Always use MELPRO-D under the environment specified in the general specification stated in the MELPRO-D Operation Manual.
  If used in an environment out of the general specification, shock, fire, malfunction, product damage or deterioration may be caused.
- When installing MELPRO-D on the board, always tighten the mounting screws within the specified torque range.
  Tightening the mounting screws too loose may cause falling, short circuit and/or malfunction. Tightening them too tight in turn may damage the screws or unit to cause falling, short circuit and/or malfunction.
- When attaching or detaching CC-COM to or from MELPRO-D, be sure to attach or detach CC-COM alongside the rail on the MELPRO-D board. Otherwise, the connector pins in the connection may be damaged, resulting in short circuit or malfunction.
- Do not touch the electronic parts or board of MELPRO-D or the electronic parts of CC-COM.
  Failure or malfunction may be caused.

[Wiring Precautions]

DANGER

- Always shut off the power supply of MELPRO-D from the outside before starting wiring.
  Carrying out wiring with the power supply on may cause shock, product damage and/or malfunction.

CAUTION

- The FG terminal should be grounded exclusively for MELPRO-D according to the Class Ⅲ grounding approach.

[Wiring Precautions]

⚠ CAUTION
● Carry out wiring of MELPRO-D always after checking the voltage rating and terminal arrangement of the product. Connecting a power supply of an inappropriate voltage rating or improper wiring may cause fire or failure. ● When performing wiring of MELPRO-D, be careful not to let any foreign substances including shield or wire chips come into the MELPRO-D unit. Fire, failure or malfunction may occur. ● Always tighten the mounting screws of MELPRO-D within the specified torque range. Tightening the terminal screws too loose may cause falling, short circuit and/or malfunction. Tightening them too tight in turn may damage the screws or unit to cause falling, short circuit and/or malfunction.

[Start-up and Maintenance Precautions]

DANGER
● Do not touch any terminal during excitation. Shock or malfunction may occur. ● Always shut off the power supply of MELPRO-D from the outside before cleaning or re-tightening the terminals. Tightening the terminal screws too loose may cause falling, short circuit and/or malfunction. Tightening them too tight in turn may damage the screws or unit to cause falling, short circuit and/or malfunction.

⚠ CAUTION
● Do not dismantle or modify MELPRO-D or CC-COM. Doing so may cause failure, malfunction, injury or fire. ● Do not touch directly the conducting part or electronic parts of MELPRO-D or CC-COM. Doing so may cause malfunction or failure. ● Do not drop MELPRO-D or give it a strong shock as it is made of resin. Doing so may cause failure.

[Disposal Precaution]

⚠ CAUTION
● When disposing of the product, treat it as industrial waste.

- Introduction -

Thank you for purchasing Mitsubishi Electric MELPRO–D Series Protection Relay (hereinafter referred to as “MELPRO-D”) CC-COM Communication Card (hereinafter referred to as “CC-COM”).
Please read this manual carefully before use to be familiar with the functions and performances of CC-COM enough to use the product properly.
Please note that end user is required to be provided with this operation manual.

– CONTENTS –

1 General description 9
1.1 Features 9
1.2 Abbreviations and terms used in this manual 11
2 System configuration 12
2.1 General CC-Link system configuration 12
2.2 Twist pair cable specification 12
3 Communication function specification 13
3.1 MELPRO-D communication functions 13
3.1.1 Setting 13
3.1.2 Display 14
3.1.3 Reset 15
3.2 I/O signals to master unit 16
3.2.1 I/O signal list 16
3.2.2 Detailed information of I/O signals 17
3.3 Allocation of remote registers 19
3.4 Command list 20
3.5 Detailed information about each command 21
3.5.1 A guide to the use of the command tables 21
3.5.2 Outline of communication 22
3.5.3 Display reset command 22
3.5.4 Fault record reset command 23
3.5.5 Self-diagnosis reset command 23
3.5.6 Max. record reset command 23
3.5.7 Operation element monitoring command 24
3.5.8 Self-diagnosis information monitoring command 25
3.5.9 DI information monitoring command 26
3.5.10 Setting value monitoring command 27
3.5.11 Real-time monitoring command 28
3.5.12 Real-time batch monitoring command 30
3.5.13 Fault record monitoring command 30
3.5.14 Waveform data monitoring command 31

3.5.15 Max. record monitoring command 32
3.5.16 Waveform next data monitoring command 32
3.5.17 Trip time monitoring command 34
3.5.18 Waveform process ratio monitoring command 34
3.5.19 Waveform initial setting monitoring command 35
3.5.20 CTVT ratio monitoring command 36
3.5.21 Ry Password Ena./Dis. monitoring command 37
3.5.22 Setting value set command 38
3.5.23 Set end command 38
3.5.24 Forced operation set command 39
3.5.25 Forced operation set end command 40
3.5.26 Waveform initial setting command 40
3.5.27 CTVT ratio setting command 41
3.5.28 Ry Password setting 42
3.5.29 Ry Password Ena./Dis. setting 42
3.5.30 Time information set command 43
3.5.31 Time monitoring command 44
3.6 Error code 45
3.7 Communication LED 46
3.8 Self-diagnosis 47
4 Sequence program sample 48
4.1 Sequence program sample 49
5 Component designation and setting 53
5.1 Component designation 53
5.2 Switch setting 54
6 Installation and wiring 55
6.1 Installation of relay unit 55
6.2 Wiring 55
6.3 How to install communication card 56
6.3.1 Communication card installation procedure 56

Manual information

The manuals indicated in the table below are prepared relating to this product.

Using the table, please order manuals if required:

Related manual

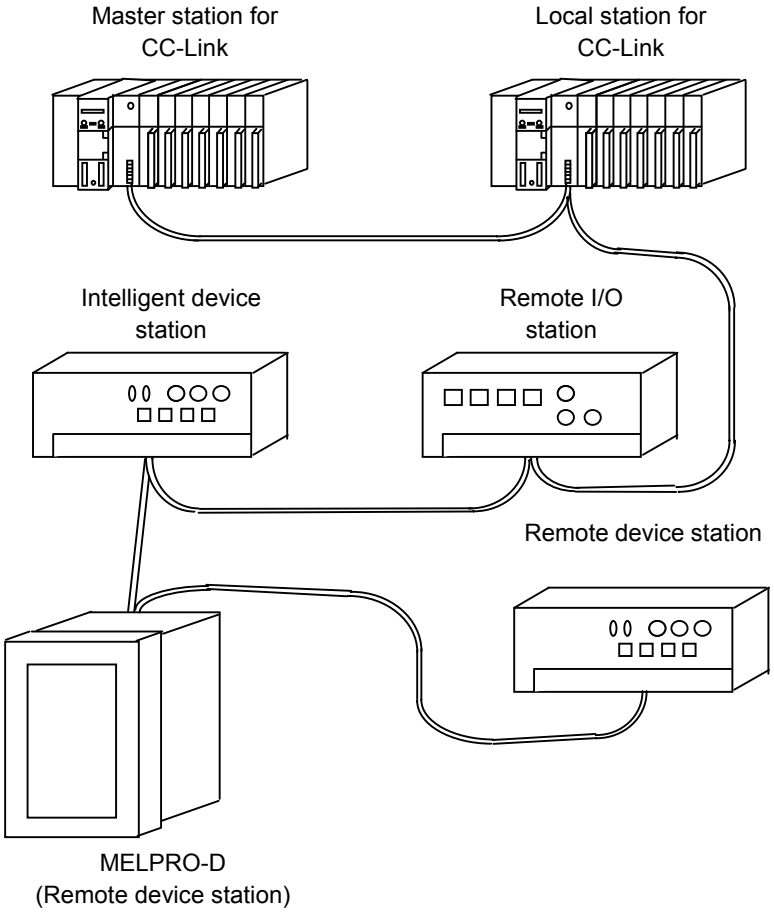
Title of manual	Manual No. (Model code)
AJ61BT11/A1SJ61BT11 CC-Link System Master/Local Unit User Manual (Detailed information)	SH-3603 (13JH79)
AJ61QBT11/A1SJ61QBT11 CC-Link System Master/Local Unit User Manual (Detailed information)	SH-3604 (13JH80)
MELPRO-D Series Protection Relay CC-COM Communication Card (CC-Link) Operation Manual (Model-specific information)	JEP0-IL9418

1 General description

This manual describes the system configuration, specification and installation of the MELPRO-D Series Protection Relay Communication Functions (hereinafter referred to as “MELPRO-D”). For the functions of the MELPRO-D relay unit itself, see the operation manual of the relay unit.

1.1 Features

(1) Can be used as a remote device station (occupying a location) to be connected to the CC-Link system.



- The system can be extended at maximum as follows: (depending on transmission rate setting)

  For 156 Kbps : 1200 m

  For 625 Kbps : 600 m

  For 2.5 Mbps : 150 m

  For 10 Mbps : 100 m

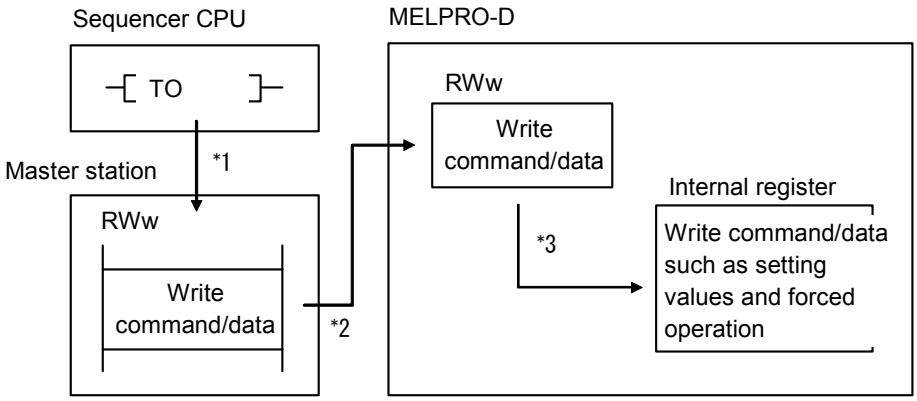
- MELPRO-D occupies a station and its point is as follows:

	One station
Remote I/O	32 points
Remote register	4 points

For the communication performance, see the AJ61BT11/A1SJ61BT11-type CC-Link System Master Local Unit User’s Manual (Detailed Edition).

(2) Using a special command, data can be read and written between the remote register and MELPRO-D internal device. Giving data of the remote register to each of the MELPRO-D internal registers will allow reading and writing of setting values, and reading of measurements and operation status data. This process requires a sequence program to execute the command.

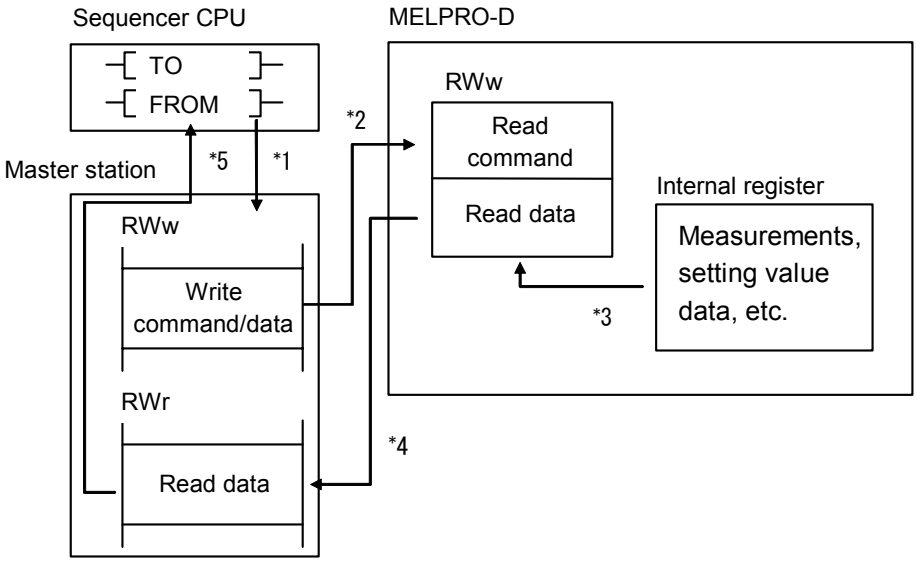
To write data in MELPRO-D by executing command:



*1 Store the write command data and other write data in the allocated remote register (RWw) of MELPRO-D using the sequence program.
*2 The command data and write data are stored in the MELPRO-D remote register through link scanning.
*3 Write the write data in the specified MELPRO-D internal register.

The write commands include setting value, time setting and forced operation set commands.

To read data out to MELPRO-D by executing command:



*1 Store the read command data in the allocated remote register (RWw) of MELPRO-D using the sequence program.
*2 The command data is stored in the MELPRO-D remote register through link scanning.
*3 With the read command, read data in the specified internal register of MELPRO-D out to the remote register (RWr).
*4 Data is read out to the MELPRO-D remote register through link scanning.
*5 Using the sequence program, read data in the remote register (RWr) out to the sequence CPU.

The read commands include setting value and time setting display commands and data save value.

1.2 Abbreviations and terms used in this manual

(1) MELPRO-D ····· A protection relay with communication functions (compatible with CC-Link)

(2) CC-COM ····· A communication card that can be mounted in MELPRO-D.

(3) CC-Link ····· The abbreviation for CC-Link system.

(4) Master station ····· A station that controls remote and local stations.
A system always requires a master station.

(5) Local station ····· A station with a CPU that can communicate with the master and local stations.

(6) Remote I/O station ····· A remote station that only processes bit data.
(AJ65BTB□-□□, AJ65BTB□-□□)

(7) Remote device station ····· A remote station that processes bit and word data.
(AJ65BT-64AD, AJ65BT-64DAV, AJ65BT-64DAI)

(8) Remote station ····· The general term for remote I/O and remote device stations.
Controlled by the master station.

(9) Intelligent device station ··· A station that can perform transient transmission. (including local stations) (AJ65BT-R2)

(10) Master/local station ····· The general term for AJ61QBT11 and A1SJ61QBT11.

(11) Master unit ····· The general term for AJ61QBT11 and A1SJ61QBT11 when they are used as master stations.

(12) Local unit ····· The general term for AJ61QBT11 and A1SJ61QBT11 when they are used as local stations.

(13) Remote unit ····· The general term for AJ65BTB□-□□, AJ65BTB□-□□, AJ65BT-64AD, AJ65BT-64DAV and AJ65BT-64DAI.

(14) RX ····· Remote input.

(15) RY ····· Remote output.

(16) RWw ····· Remote register (write area)

(17) RWr ····· Remote register (read area)

2 System configuration

2.1 General CC-Link system configuration

A master station can be connected to remote I/O stations, remote device stations (including MELPRO-D) and local stations of the total number of up to 64.

In this case, the following conditions should be met:

(1) { (1×a) + (2×b) + (3×c) + (4×d) } ≤ 64

a : The number of units occupied by a station

b : The number of units occupied by two stations

c : The number of units occupied by three station

d : The number of units occupied by four stations

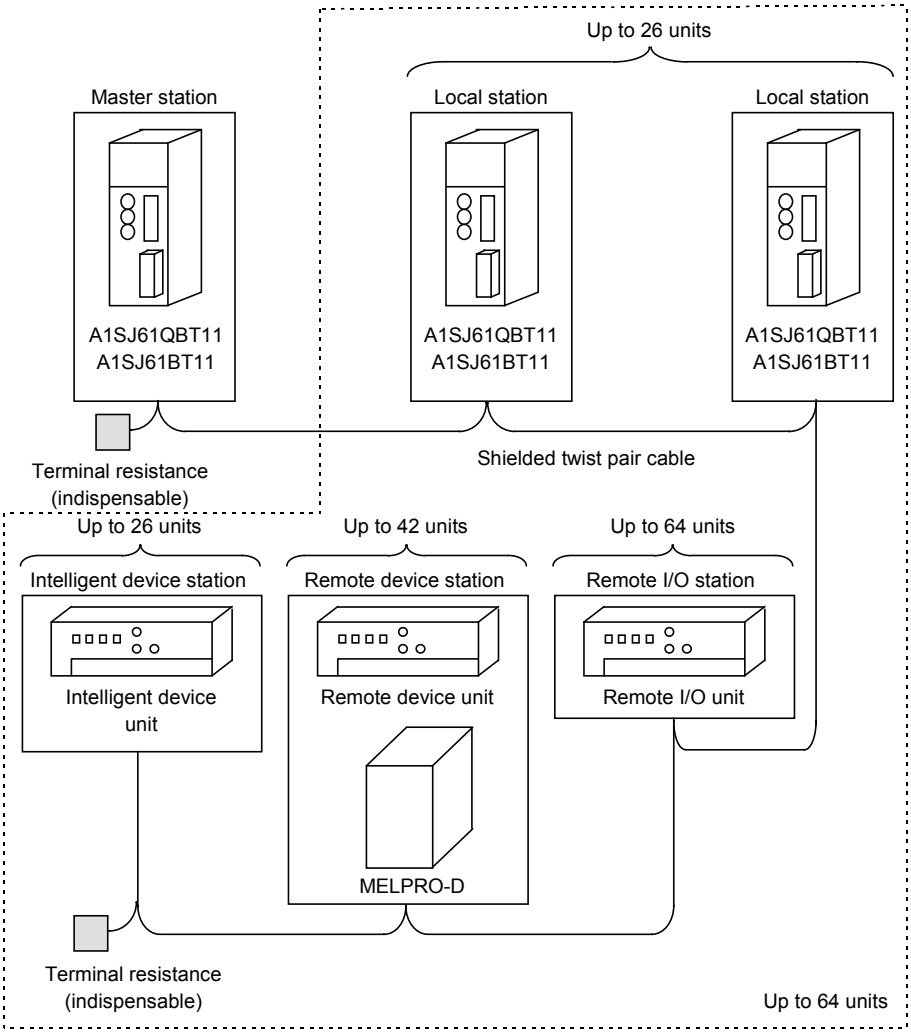
(2) { (16×A) + (54×B) + (88×C) + (88×D) } ≤ 2304

A : The number of remote I/O stations ≤ 64

B : The number of remote device stations ≤ 42

C : The number of intelligent device stations ≤ 26

D : The number of local stations ≤ 26



2.2 Twist pair cable specification

See the CC-Link System Master/Local Unit User Manual (detailed information).

3 Communication function specification

3.1 MELPRO-D communication functions

	Function	Communication
Setting	Setting values	Change the setting value in the relay unit.
	Forced operation	Perform forced operation of the output contacts of the relay unit.
	Time	Allows setting of internal time of the communication card.
Display	Setting values	Read the setting values stored in the relay unit.
	Measurement	Read the measurements computed in the relay unit.
	Max. value	Read the input max. values stored in the relay unit.
	Fault record	Read the measurements at the time of trip.
	Self-diagnosis	Read the result of automatic self-check.
	Operation elements	Read the operation elements at the time of trip.
	Operation time	Read the trip time.
	Current time	Read the internal time of the communication card.
	Waveform record	Read the waveform at the time of trip.
Reset	Display reset	Reset the operation indicator LEDs at the time of trip.
	Self-diagnosis reset	Reset the result of self-diagnosis.
	Fault record reset	Reset all the phenomena of fault record, operation elements and operation time.
	Max. record reset	Reset the max. record.

3.1.1 Setting

(1) Setting value

To change a setting value stored in the relay unit, you need to perform a two-step procedure. In the first step, you will send a setting value set command and a new setting value from the master station to the relay unit. The relay unit will check the new setting value to see if it can be written or not. If can be written, the relay unit will send the same data back to the master station. When this data is checked against the original data in the master station and it is proven that the both are identical, you can send a set end signal from the master station to put the setting entry process forward.

Only an setting item can be set in a communication cycle.

(2) Forced operation

To perform forced operation, you need to perform a two-step procedure. In the first step, you will send a forced operation set command and target element data from the master station to the relay unit. The relay unit will check this setting to see if the value can be written or not. If can be written, the relay unit will send the same data back to the master station. When this data is checked against the original data in the master station and it is proven that the both are identical, you can send a set end signal from the master station to put the setting entry process forward.

Only an operation element can be set for forced operation in a communication cycle .

(3) Time

To set time, you will send year, month, date, hour, minute and second data as well as a time set command from the master station.

All of the year, month, date, hour, minute and second data can be set in a communication cycle.

(4) Relay password

The password of relay can be set by communication from master station. And the password should be four-character code (hexadecimal). The four-character code (one password) can be sent in a communication cycle.

3.1.2 Display

(1) Setting value

When a setting value monitoring command and a channel number with which data is to be displayed are sent from the master station, the setting values specified with the channel number will be retrieved.

Only an item of setting value data can be retrieved in a communication cycle.

(2) Measurement

When a real-time command and a channel number with which data is to be displayed are sent from the master station, the measurement specified with the channel number will be retrieved.

Only an item of measurement data can be retrieved in a communication cycle.

(3) Max. value

When a max. value command and a channel number with which data is to be displayed are sent from the master station, the max. value specified with the channel number will be retrieved.

Only an item of max. value data can be retrieved in a communication cycle.

(4) Fault record

When a fault record command and channel and phenomenon numbers with which data is to be displayed are sent from the master station, the fault record data specified with the channel and phenomenon numbers will be retrieved.

Only an item of fault record data can be retrieved in a communication cycle.

(5) Self-diagnosis

When a self-diagnosis command is sent from the master station, the current result of self-diagnosis will be retrieved.

All the items described later can be retrieved in a communication cycle.

(6) Operation element

When an operation element command, data display item and phenomenon number are sent from the master station, the operation element specified with the phenomenon number will be

retrieved.

Only operation element data for a phenomenon can be retrieved in a communication cycle.

(7) Operation time

When an operation time command, data display item and phenomenon number are sent from the master station, the operation time data specified with the phenomenon number will be retrieved.

Only operation time data for a phenomenon can be retrieved in a communication cycle.

(8) Current time

When a time monitoring command is sent from the master station, the current time data will be retrieved.

All of the year, month, date, hour, minute and second data can be retrieved in a communication cycle.

(9) Waveform record

When a waveform command, phenomenon and channel numbers and retrieve range are sent from the master station, part of the waveform data specified with the retrieve range will be retrieved.

Four points of data (sampling data of 30° is counted as one point) can be retrieved in a communication cycle.

3.1.3 Reset

(1) Display reset

When a display reset command is sent from the master station, the operation indicator LEDs on the front panel of the relay unit will be reset.

(2) Self-dignosis

When an automatic self-check command is sent from the master station, the self-diagnosis result will be reset.

(3) Fault record reset

When a fault record reset command is sent from the master station, the fault record, operation element, operation time and waveform data for all the phenomena will be reset.

(4) Max. record reset

When a max. record reset command is sent from the master station, the max. record for all the channels will be reset.

3.2 I/O signals to master unit

3.2.1 I/O signal list

The table below shows the allocation of I/O signals:

The letter “n” in the table indicates a master unit address allocated by channel setting.

Signal direction : Communication card → Master unit		Signal direction : Master unit → Communication card	
Device No. Number of stations occupied :One station	Signal name	Device No. Number of stations occupied : One station	Signal name
RXn0(+)	Self-diagnosis result	RYn0	Unable to be used
RXn1(+)	Data readout permission flag	RYn1	
RXn2(+)	Operation indicator 1	RYn2	
RXn3(+)	Operation indicator 2	RYn3	
RXn4(+)	Operation indicator 3	RYn4	
RXn5(+)	Operation indicator 4	RYn5	
RXn6(+)	Operation indicator 5	RYn6	
RXn7(+)	Operation indicator 6	RYn7	
RXn8(+)	Operation indicator 7	RYn8	
RXn9(+)	Operation indicator 8	RYn9	
RxnA(+)	Operation indicator 9	RynA	
RXnB(+)	Operation indicator 10	RYnB	
RXnC(+)	Operation indicator 11	RYnC	
RXnD(+)	Operation indicator 12	RYnD	
RxnE(+)	Operation indicator 13	RYnE	
RXnF	Command end response flag	RYnF	Command execute request flag
RX(n+1)0	Unable to be used	RY(n+1)0	Unable to be used
RX(n+1)1		RY(n+1)1	
RX(n+1)2		RY(n+1)2	
RX(n+1)3		RY(n+1)3	
RX(n+1)4		RY(n+1)4	
RX(n+1)5		RY(n+1)5	
RX(n+1)6		RY(n+1)6	
RX(n+1)7		RY(n+1)7	
RX(n+1)8		RY(n+1)8	
RX(n+1)9		RY(n+1)9	
RX(n+1)A	Error status flag	RY(n+1)A	Error reset status flag
RX(n+1)B	Remote READY	RY(n+1)B	Unable to be used
RX(n+1)C	Unable to be used	RY(n+1)C	
RX(n+1)D		RY(n+1)D	
RX(n+1)E		RY(n+1)E	
RX(n+1)F		RY(n+1)F	

(+) RXn0~RxnE signals are updated at 100ms interval.

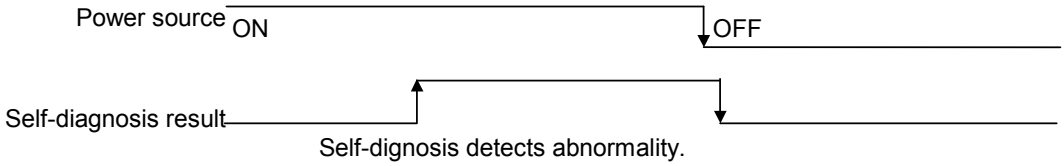
Important
In case one of the devices that are inhibited from use is turned on or off through the sequence program, the proper function of the communication card can not be guaranteed.

3.2.2 Detailed information of I/O signals

The following explains the function of each I/O signal:

(1) Self-diagnosis result

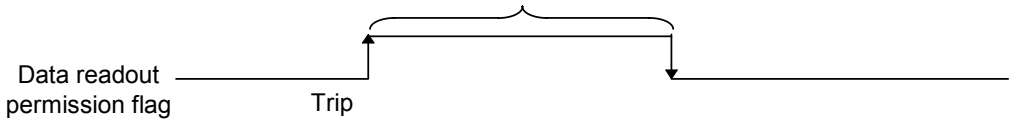
This bit will be ON when the automatic self-check provided by the MELPRO-D internal S/W shows abnormal condition. To turn OFF the Self-diagnosis result, switch the power OFF.



(2) Data readout permission flag

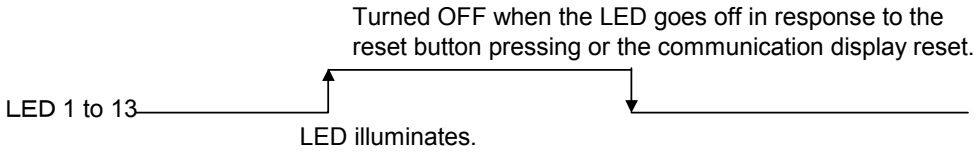
This bit will be ON when MELPRO-D operates. Note that operation time, operation element, fault record, or waveform data should be read only after this bit is switched from ON to OFF. Each data pertaining to the above items is saved when this flag is ON.

ON status for the time corresponding to the number of save cycles (10 to 224 cycles) after the waveform initial setting (B9H).



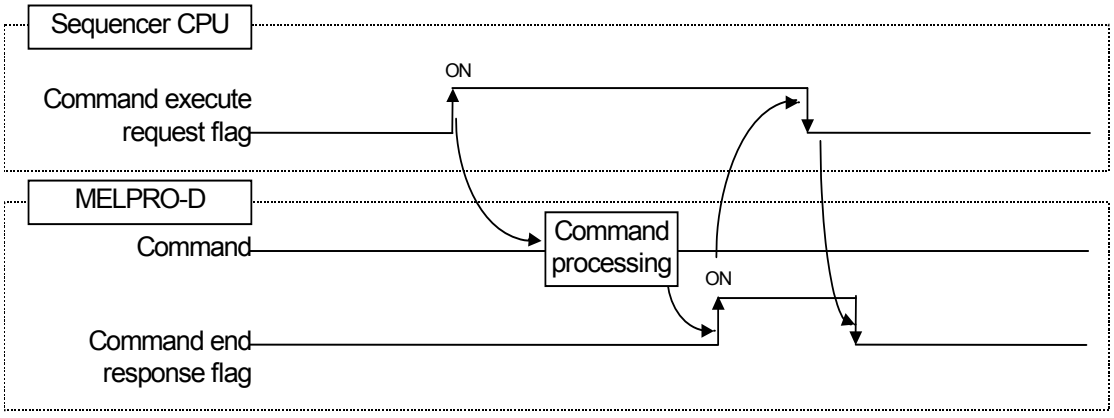
(3) LED 1 to 13

Shows the operating LED status on the front panel. The illuminated LED indicates ON status. For detailed descriptions of each LED, see the MELPRO-D Protection Relay CC-COM Communication Card User's Manual (Model-specific information JEPO-IL9336).



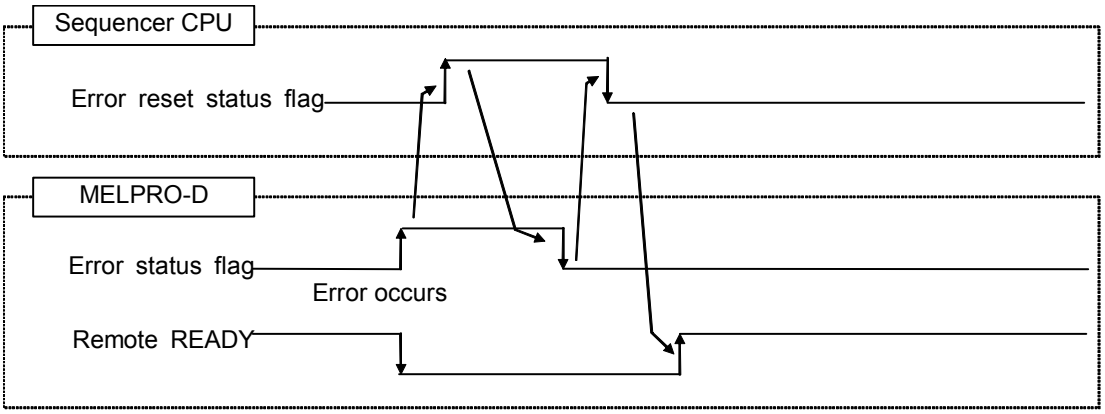
(4) Command end response flag, command execute request flag

Making the command request flag ON will execute the requested command using the internal device. When data to each command is received in the remote station and the command end flag is ON, the command execute request flag will be OFF. When the remote station confirms that the command execute request flag has become OFF, the command end response flag will be OFF.



(5) Error status flag, Remote READY, Error reset status flag

Error status flag becomes ON status when error of remote station occurs. At the same time, remote READY becomes OFF status. In order to make command transmit available, it is necessary to edit the Sequencer CPU program. And in order to let error status flag of remote station OFF, it is necessary to make error reset status flag for transmitting from master station ON status.



3.3 Allocation of remote registers

The following shows the allocation of the remote registers of the communication card.

For the commands used for communication between internal devices, see the section 3.4.

The letters “m” and “n” on the table indicate address allocated in the master unit by channel setting.

Transmission	Address Occupied station: one station	Description	Default value
Master station → Remote device station	RWwm ~ RWwm+3	Execution command area to perform monitoring or setting using internal device	0
Remote device station → Master station	RWrn ~ RWrn+3	Execution command area to perform monitoring or setting using internal device	0

3.4 Command list

The table below shows the command list:

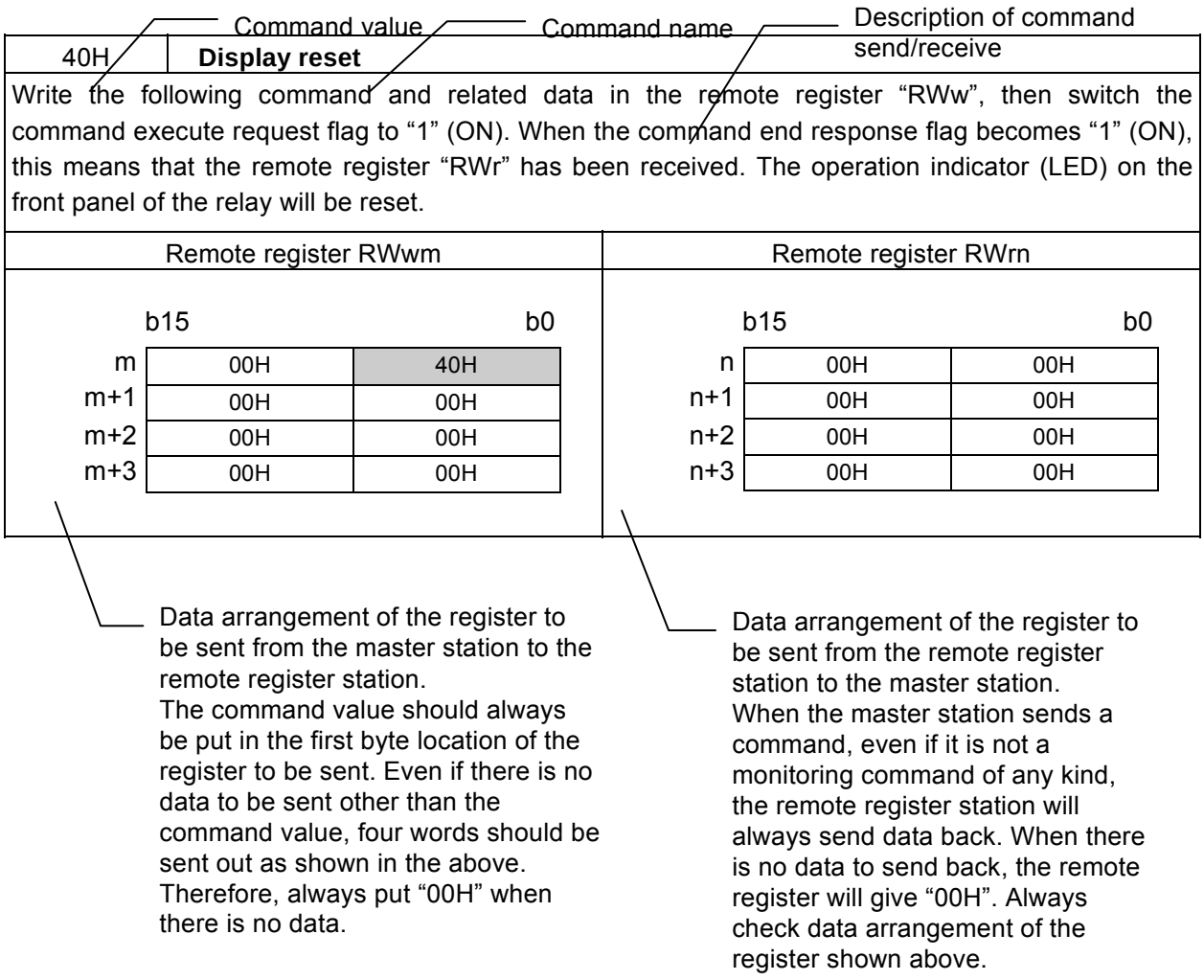
Command name	Command value	Description
Display reset	40H	A command to extinguish the operation indicator that lighted up when the relay operated on the front panel of the relay unit.
Fault record reset	43H	A command to clear the fault record.
Self-diagnosis reset	45H	A command to reset the result of self-diagnosis reset.
Max. record reset	46H	A command to reset the max. record.
Operation element monitoring	70H	A command to monitor information about the operation element that worked upon relay trip.
Self-diagnosis information monitoring	73H	A command to monitor the self-diagnosis result of the relay internal S/W.
DI information monitoring	75H	A command to monitor DI input information.
Setting value monitoring	80H	A command to monitor setting values set in the relay.
Real-time monitoring	83H	A command to monitor measurements computed inside the relay.
Real-time batch monitoring	85H	A command to monitor 4 channels at a time.
Fault record monitoring	86H	A command to monitor the fault record created when the relay operated.
Waveform data monitoring	89H	A command to monitor input waveform data created when the relay operated.
Max. record monitoring	8AH	A command to monitor the max. value of each measurement item.
Waveform next data monitoring	8CH	A command to monitor next data, following the waveform data command.
Trip time monitoring	8FH	A command to monitor the time registered when the relay operated.
Waveform process ratio monitoring	91H	A command to monitor the scale conversion value of waveform data.
Waveform initial setting monitoring	92H	A command to monitor the initial setting to be used to save waveform data.
CTVT ratio monitoring	97H	A command to monitor CT ratio or VT ratio.
Ry Password Ena./Dis. monitoring	9BH	A command to monitor Ry Password Ena./Dis.
Setting value set	B0H	A command to set setting values in the relay.
Setting value set end	B3H	A command to put the specified setting values into force.
Forced operation set	B5H	A command to set forced operation in the relay.
Forced operation set end	B6H	A command to execute the specified forced operation.
Waveform initial setting	B9H	A command to perform initialization to save waveform data.
CTVT ratio setting	BAH	A command to set CT ratio or VT ratio.
Ry Password setting	BCH	A command to set relay password when setting.
Ry Password Ena./Dis. setting	BFH	A command to set rely password enable or disable.
Time information setting	D0H	A command to set time.
Time monitoring	D3H	A command to monitor the current time.

Note: Do not use any other command values than those listed in the table above.

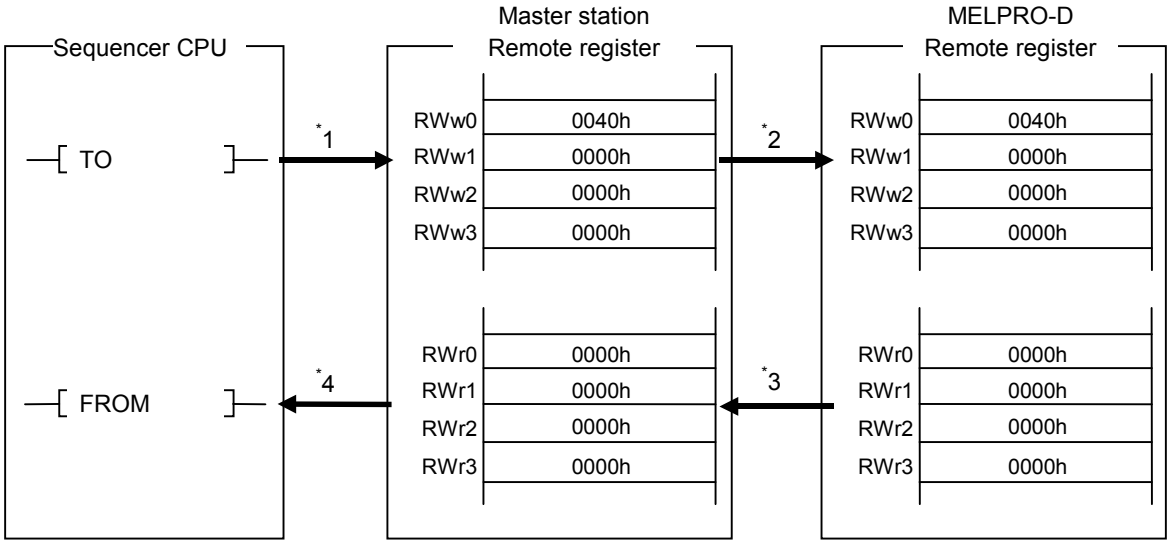
3.5 Detailed information about each command

3.5.1 A guide to the use of the command tables

The following explains how to use the command tables that appear in the sub sections after 3.5.2.



3.5.2 Outline of communication



*1 Store command data and the data relating to the command in the remote register (RWw) of the master station.

*2 Switch the command execute request flag to ON and store the command data in the remote register (RWw). The requested data will be read out to the remote register (RWr).

*3 The read data is stored in the remote register (RWr) of the master station through link scanning.

*4 The data is read out to the sequencer CPU by FROM or other instruction.

3.5.3 Display reset command

40H	**Display reset**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. The operation indicator (LED) on the front panel of the relay will be reset.

Remote register RWwm

	b15	b0
m	00H	40H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

3.5.4 Fault record reset command

43H	**Fault record reset**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. The fault record for all the phenomena will be cleared.

Remote register RWwm

	b15	b0
m	00H	43H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

3.5.5 Self-diagnosis reset command

45H	**Self-diagnosis reset**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. The self-diagnosis result will be reset.

Remote register RWwm

	b15	b0
m	00H	45H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

3.5.6 Max. record reset command

46H	**Max. record reset**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. The max. record will be all cleared.

Remote register RWwm

	b15	b0
m	00H	46H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

3.5.7 Operation element monitoring command

70H	**Operation element monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain information about the alarm status and the operation element that operated upon trip.

Remote register RWwm

	b15 – b0	
m	Phenomenon number	70H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data 1	Lower order data 1
n+1	Higher order data 2	Lower order data 2
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Phenomenon number allocation

Phenomenon number	Description
00H	1st phenomenon (latest)
O1H	2nd phenomenon
02H	3rd phenomenon
03H	4th phenomenon
04H	5th phenomenon (oldest)

Data description

	bit	Description	For “1”	For “0”
Lower order data 1	b0	Relay operation information 1	Operate	Not operate
	b1	Relay operation information 2		
	b2	Relay operation information 3		
	b3	Relay operation information 4		
	b4	Relay operation information 5		
	b5	Relay operation information 6		
	b6	Relay operation information 7		
	b7	Relay operation information 8		
Higher order data 1	b8	Relay operation information 9		
	b9	Relay operation information 10		
	b10	Relay operation information 11		
	b11	Relay operation information 12		
	b12	Relay operation information 13		
	b13	Relay operation information 14		
	b14	Relay operation information 15		
	b15	Relay operation information 16		
Lower order data 2	b0	Relay operation information 17		
	b1	Relay operation information 18		
	b2	Relay operation information 19		
	b3	Relay operation information 20		
	b4	Relay operation information 21		
	b5	Relay operation information 22		
	b6	Relay operation information 23		
	b7	Relay operation information 24		
Higher order data 2	b8	Relay operation information 25		
	b9	Relay operation information 26		
	b10	Relay operation information 27		
	b11	Relay operation information 28		
	b12	Relay operation information 29		
	b13	Relay operation information 30		
	b14	Relay operation information 31		
	b15	Relay operation information 32		

For the relay operation information, see the MELPRO-D Series Protection Relay CC-COM Communication Card User Manual (model-specific information) (JEPO-IL9336).

3.5.8 Self-diagnosis information monitoring command

73H	**Self-diagnosis information monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain self-diagnosis information inside the relay.

Remote register RWwm

	b15	b0
m	00H	73H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data 1	Lower order data 1
n+1	Higher order data 2	Lower order data 2
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Data description

	bit	Description	For “1”	For “0”
Lower order data 1	b0	ROM check	Abnormal	Normal
	b1	RAM check		
	b2			
	b3	A/I check		
	b4	A/D check		
	b5	SRAM check		
	b6			
	b7	D/O status check		
Higher order data 1	b8	D/O operation check		
	b9	Analog filter check		
	b10	A/I dual check		
	b11	D/I dual check *1		
	b12	EEPROM check		
	b13	Computing function check		
	b14	WDT check		
	b15	Data transfer check *2		
Lower order data 2	b0	Differential current check *3		
	b1			
	b2			
	b3			
	b4			
	b5			
	b6			
	b7			
Higher order data 2	b8			
	b9			
	b10			
	b11	Communication card check *4		
	b12	Communication card channel No. switch setting error *4		
	b13	Communication card baud rate switch setting error *4		
	b14	Communication card channel No. switch change error *4		
	b15	Communication card baud rate switch change error *4		

*1 Monitored only in the models with built-in D/I function.

*2 Monitored only in the models with D2 unit.

*3 Monitored only the biased differential relay.

*4 Monitored only when the relay is installed with optional communication card.

3.5.9 DI information monitoring command

75H	**DI information monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain DI information.

Remote register RWwm

	b15	b0
m	00H	75H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	Data
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Data description

bit	Description	For “1”	For “0”
B0	DI information 1	Operate	Not operate
B1	DI information 2	Operate	Not operate
B2	DI information 3	Operate	Not operate
B3	DI information 4	Operate	Not operate
B4	DI information 5	Operate	Not operate
B5	DI information 6	Operate	Not operate
B6	DI information 7	Operate	Not operate
B7	DI information 8	Operate	Not operate

3.5.10 Setting value monitoring command

80H	**Setting value monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the setting values already set in the relay.

Remote register RWwm

	b15	b0
m	Channel number	80H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data	Lower order data
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Channel number allocation

Channel	Name	Channel	Name	Channel	Name	Channel	Name
00H	Setting value 1	10H	Setting value 17	20H	Setting value 33	30H	Setting value 49
01H	Setting value 2	11H	Setting value 18	21H	Setting value 34	31H	Setting value 50
02H	Setting value 3	12H	Setting value 19	22H	Setting value 35	32H	Setting value 51
03H	Setting value 4	13H	Setting value 20	23H	Setting value 36	33H	Setting value 52
04H	Setting value 5	14H	Setting value 21	24H	Setting value 37	34H	Setting value 53
05H	Setting value 6	15H	Setting value 22	25H	Setting value 38	35H	Setting value 54
06H	Setting value 7	16H	Setting value 23	26H	Setting value 39	36H	Setting value 55
07H	Setting value 8	17H	Setting value 24	27H	Setting value 40	37H	Setting value 56
08H	Setting value 9	18H	Setting value 25	28H	Setting value 41	38H	Setting value 57
09H	Setting value 10	19H	Setting value 26	29H	Setting value 42	39H	Setting value 58
0AH	Setting value 11	1AH	Setting value 27	2AH	Setting value 43	3AH	Setting value 59
0BH	Setting value 12	1BH	Setting value 28	2BH	Setting value 44	3BH	Setting value 60
0CH	Setting value 13	1CH	Setting value 29	2CH	Setting value 45	3CH	Setting value 61
0DH	Setting value 14	1DH	Setting value 30	2DH	Setting value 46	3DH	Setting value 62
0EH	Setting value 15	1EH	Setting value 31	2EH	Setting value 47	3EH	Setting value 63
0FH	Setting value 16	1FH	Setting value 32	2FH	Setting value 48	3FH	Setting value 64

For the description of each setting value, see the MEPRO-D Protection Relay CC-COM Communication Card User Manual (Model-specific information) (JEPO-IL9336).

3.5.11 Real-time monitoring command

83H	**Real-time monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the requested measurement. The interval of the command sending should be longer than 200ms.

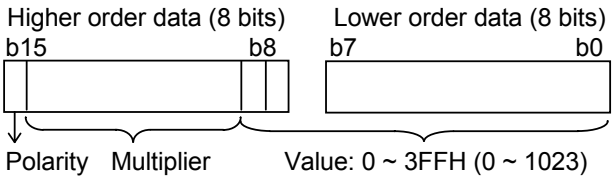
Remote register RWwm

	b15	b0
m	Channel number	83H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data	Lower order data
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting



The bit configuration above represents the figure as shown in the right: $\pm\square.\ \square\square \times 10^{\pm n}$

<Value > Value is expressed in a 3-digit decimal number. The decimal point is fixed for all values as shown in the right: □. □□ (Example: When the ten bits above represents “356” (decimal number), it will be read as “3.56”.)

< Multiplier > The value above will be multiplied by “$\times\ 10^{\pm n}$”. In this calculation, the section “±n” is called a multiplier. The “b14” represents “+” or “ - “ of the multiplier. b14=0 : $\times\ 10^{+n}$, b14=1 : $\times\ 10^{-n}$

< Polarity > b15=0 : The value is a positive number. b15=1 : The value is a negative number.

Regarding phase measurement, value data is equal to phase measurement. Multiplier and Polarity have no meanings.[Example] In case of +10 deg.: 000AH, In case of –10 deg.: FFF6H, In case of –179 deg.: FF4DH.

Frequency, power factor and phase measurement are held at fixed value while ac voltage is gone down to low level as an error of measurement data is bigger than the normal condition.

<Notes>

#1 Phase

< Numerical value > doesn't follow the format of the above-mentioned, and numerical value equal to the phase value. The polarity and the multiplier are disregarded.

[Example for] +10° : For 000AH, -10° : For FFF6H, -179° :For FF4DH

However, when the input value of the voltage and the current is too small to be calculated, 10000(2710H) will be returned.

#2 Power factor

< Numerical value > follows the format of the above-mentioned, and the expression of leading power factor and Lagging power factor is as follows. Leading power factor b15=0, Lagging power factor b15=1 When the input value of the voltage and the current is too small to be calculated, 1000(0864H) will be returned.

#3 Power and reverse-power

< Numerical value > follows the format of the above-mentioned, and the unit is kW.

#4 %

< Numerical value > doesn't follow the format of the above-mentioned, and numerical value equal to the phase value. The polarity and the multiplier are disregarded.

#5 Frequency

< Numerical value > follows the format of the above-mentioned, and numerical value equal to the phase value. When the input value of the voltage is small and cannot be operated, returns 0.

Channel number

Channel number	Description	Channel number	Description	Channel number	Description
10H	Calculated value 1-1	20H	Calculated value 2-1	30H	Calculated value 3-1
11H	Calculated value 1-2	21H	Calculated value 2-2	31H	Calculated value 3-2
12H	Calculated value 1-3	22H	Calculated value 2-3	32H	Calculated value 3-3
13H	Calculated value 1-4	23H	Calculated value 2-4	33H	Calculated value 3-4
14H	Calculated value 1-5	24H	Calculated value 2-5	34H	Calculated value 3-5
15H	Calculated value 1-6	25H	Calculated value 2-6	35H	Calculated value 3-6
16H	Calculated value 1-7	26H	Calculated value 2-7	36H	Calculated value 3-7
17H	Calculated value 1-8	27H	Calculated value 2-8	37H	Calculated value 3-8
18H	Calculated value 1-9	28H	Calculated value 2-9	38H	Calculated value 3-9
19H	Calculated value 1-10	29H	Calculated value 2-10	39H	Calculated value 3-10
1AH	Calculated value 1-11	2AH	Calculated value 2-11	3AH	Calculated value 3-11
1BH	Calculated value 1-12	2BH	Calculated value 2-12	3BH	Calculated value 3-12
1CH	Calculated value 1-13	2CH	Calculated value 2-13	3CH	Calculated value 3-13
1DH	Calculated value 1-14	2DH	Calculated value 2-14	3DH	Calculated value 3-14
1EH	Calculated value 1-15	2EH	Calculated value 2-15	3EH	Calculated value 3-15
1FH	Calculated value 1-16	2FH	Calculated value 2-16	3FH	Calculated value 3-16

For more information on the calculated values, see the MEPRO-D Protection Relay CC-COM Communication Card User Manual (model-specific information) (JEPO-IL9336).

3.5.12 Real-time batch monitoring command

85H	**Real-time batch monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the requested real-time data for 4 channels. Note that this function can only work for the case in which 4-channel data is to be read. If even one of the 4 channels is specified with a wrong number, data can not be read. The interval of the command sending should be longer than 200ms.

Remote register RWwm

	b15	b0
m	Channel number 1	85H
m+1	Channel number 3	Channel number 2
m+2	00H	Channel number 4
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data 1	Lower order data 1
n+1	Higher order data 2	Lower order data 2
n+2	Higher order data 3	Lower order data 3
n+3	Higher order data 4	Lower order data 4

m, n : address allocated by channel setting

For more information about the channel number and data, see the section of the real time monitoring (83H).

3.5.13 Fault record monitoring command

86H	**Fault record monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the requested fault record.

Remote register RWwm

	b15	b0
m	Channel number	86H
m+1	00H	Phenomenon number
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data	Lower order data
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

For more information about the channel number and data, see the section of the real-time monitoring (83H).

For the phenomenon number, see the section of the operation element monitoring command (70H).

3.5.14 Waveform data monitoring command

89H	**Waveform data monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the requested data save value. The initial reading of waveform data should be done with this command, but the successive data should be read with 8CH.

Remote register RWwm

	b15	b0
m	Channel number	89H
m+1	Retrieve cycle count	Phenomenon number
m+2	Read start point judgement	Start cycle count
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data	Lower order data
n+1	Higher order data	Lower order data
n+2	Higher order data	Lower order data
n+3	Higher order data	Lower order data

m, n : address allocated by channel setting

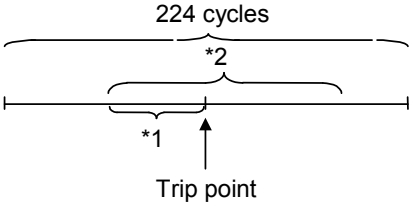
Channel number

Channel number	Description
A1H	CH1
A2H	CH2
A3H	CH3
A4H	CH4
B1H	CH5
B2H	CH6
B3H	CH7
B4H	CH8
C1H	CH9
C2H	CX10
C3H	CH11
C4H	CH12

For the phenomenon number, see the section of the operation element monitoring command (70H).

For the channel number, see the MELPRO-D Series Protection Relay CC-COM Communication Card User Manual (model-specific information) (JEPO-IL 9336).

Example of reading retrieved data



*1 Start cycle count
*2 Retrieve cycle count
Read start point judgment
00H:before trip , trip point 01H: after trip

< Example >

*1 10 cycles : AH *2 26 cycles : 1AH
Read start point judgment 00H

In the example above, data for 26 cycles from the point which is 10 cycles before the trip point is retrieved. Therefore, the data amount of:

12 pcs./cycle × 26 cycles × 1 word/piece = 312 words

will be transferred.

b15	b0
Higher order data - 1 cycle	Lower order data - 1 cycle
Higher order data - 2 cycles	Lower order data - 2 cycles

Higher order data - 10 cycles	Lower order data - 10 cycles
Higher order data - 11 cycle	Lower order data - 11 cycle

Higher order data - 25 cycles	Lower order data - 25 cycles
Higher order data - 26 cycles	Lower order data - 26 cycles

Since data is transmitted by 4 words, 78 transmissions will be needed (312/4 = 78 times). The number of times of data sending will be controlled by the program in the CC-Link master station.

3.5.15 Max. record monitoring command

8AH	**Max. record monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the requested max. record.

Remote register RWwm

	b15	b0
m	Channel number	8AH
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data	Lower order data
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

For the channel number and data, see the section of the real-time monitoring (83H).

3.5.16 Waveform next data monitoring command

8CH	**Waveform next data monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the waveform data. The waveform data monitoring command “89H” should be used to set a monitoring range and read the initial 4-word data. This “8CH” command should be issued when retrieving the following 4-word data or after. The master station will determine how many times to send data. Only the initial transmission will be made with the command “89H” and the second and successive transmissions will be made with “8CH”. Do not use the command “89H” until the whole data of the target channel is read in. Please note that, if “8CH” is sent without “89H” setting, desired data can not be read.

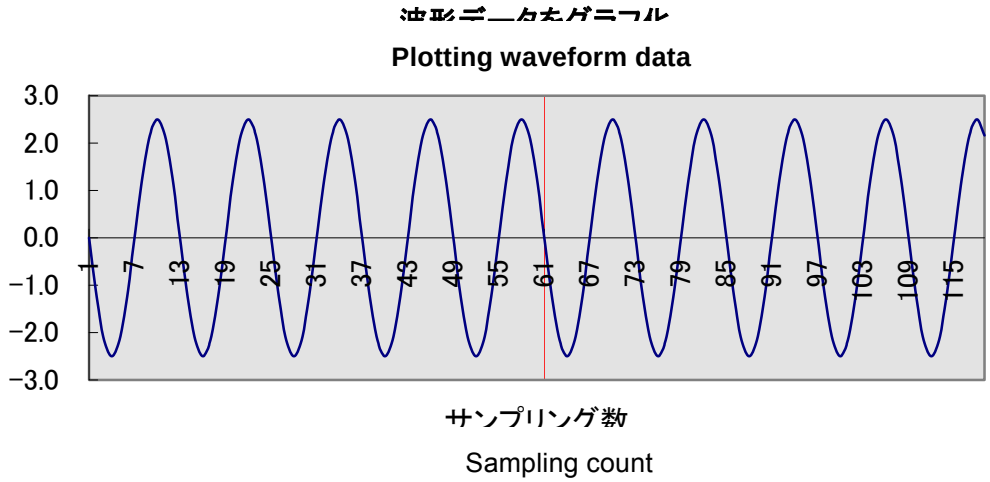
Remote register RWwm

	b15	b0
m	00H	8CH
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data	Lower order data
n+1	Higher order data	Lower order data
n+2	Higher order data	Lower order data
n+3	Higher order data	Lower order data

m, n : address allocated by channel setting



Waveform data is accumulated by sampling every 30°. As 30° sampling data is counted as one point, one cycle (360°) will be 12 points data. To retrieve waveform data, first issue the command “89H” to specify a desired channel, phenomenon number, and data length (number of cycles) for which you want to get data. Of the total data volume you specified, you will only obtain the leading data of 4 points in the first stage. Next, send the command “8CH” in turn to retrieve the following 4-point data. To obtain data for one cycle (12 points data). That is, you will first read the beginning 4-point data with “89H”, then send “8CH” twice to read the rest.

For instance, in the case you want to get data for 10 cycles spanning before and after a trip as shown in the figure above (the red line shows the occurrence of trip), a “89H” command should be sent once (always first) and followed by 29 times of “89H” command. Note that data of another channel can not be read during data retrieval. For example, where you want to read 10-cycle data of the channel #1, if you carry out another setting for the channel #2 at the time when you have just read data for only 3 cycles of the channel #1, data that can be read with “8CH” will be limited to the channel #2 data. In other words, the command “8CH” will only allow reading data of the channel specified with the “89H”. If “8CH” data is sent without “89H” setting, desired data can not be obtained. When reading waveform data, always specify data with the command “89H” before using “8CH”.

3.5.17 Trip time monitoring command

8FH	**Relay trip time monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the relay trip time information.

Remote register RWwm

	b15	b0
m	Phenomenon number	8FH
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order year data	00H
n+1	Lower order year data	Month data
n+2	Date data	Hour data
n+3	Minute data	Second data

m, n : address allocated by channel setting

For the phenomenon number, see the section of the operation element monitoring command (70H).

For data, see the section of the time data setting (D0H).

3.5.18 Waveform process ratio monitoring command

91H	**Waveform process ratio monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the waveform scale conversion value for the specified channel.

Remote register RWwm

	b15	b0
m	Channel number	91H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order data	Lower order data
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

For the channel number, see the section of the waveform monitoring command (89H).

For data, see the section of the real time command (83H).

3.5.19 Waveform initial setting monitoring command

92H	**Waveform initial setting monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the waveform initial setting.

Remote register RWwm

	b15	b0
m	00H	92H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	0rder data
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

0rder data : Save cycle count after selected operation

For more information, see the section of the waveform initial setting command (B9H).

3.5.20 CTVT ratio monitoring command

97H	**CTVT ratio monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the CT ratio or VT ratio.

Remote register RWwm

	b15	b0
m	Channel number	97H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

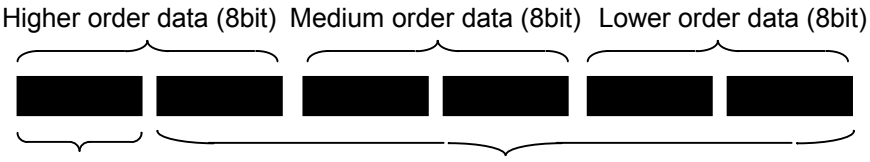
	b15	b0
n	Medium order data	Lower order data
n+1	00H	Higher order data
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Channel number allocation

Channel	Description	Channel	Description
00H	CTVT ratio 1	08H	CTVT ratio 9
01H	CTVT ratio 2	09H	CTVT ratio 10
02H	CTVT ratio 3	09H	CTVT ratio 11
03H	CTVT ratio 4	0BH	CTVT ratio 12
04H	CTVT ratio 5	0CH	CTVT ratio 13
05H	CTVT ratio 6	0DH	CTVT ratio 14
06H	CTVT ratio 7	0EH	CTVT ratio 15
07H	CTVT ratio 8	0FH	CTVT ratio 16

Data configuration



Since the obtained data value is 10 times larger than the value actually set, divide it by 10.

For more information about data, see the MELPRO-D Series Protection Relay CC-COM Communication Card User Manual (model-specific information) (JEPO-IL 9336).

3.5.21 Ry Password Ena./Dis. monitoring command

9BH	**Ry Password Ena./Dis. monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the Ry Password Ena./Dis.

Remote register RWwm

	b15	b0
m	00H	92H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	0rder data
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

0rder data : [0] Disable, [1] Enable

3.5.22 Setting value set command

B0H	**Setting value set monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the exactly same data as what was sent as the setting. The sequence program should be so designed that a set end command (B3H) will be issued when the setting data sent and the setting data received are compared to be found identical. The comparison should be programmed in the sequence of the master station.

Remote register RWwm

	b15	b0
m	Channel number	B0H
m+1	Higher order data	Lower order data
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Channel data	B0H
n+1	Higher order data	Lower order data
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

For the channel number and data, see the section of the setting value monitoring command (80H).

3.5.23 Set end command

B3H	**Set end**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will enable the setting specified with the command B0H.

Remote register RWwm

	b15	b0
m	00H	B3H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

3.5.24 Forced operation set command

B5H	**Forced operation setting monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the exactly same data as what was sent as the setting. The sequence program should be so designed that a set end command (B6H) will be issued when the setting data sent and the setting data received are compared to be found identical. The comparison should be programmed in the sequence of the master station.

Remote register RWwm

	b15	b0
m	Element number	B5H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Element number	B5H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Element number allocation table

Element number	Description	Element number	Description	Element number	Description
00H	Forced operation element 1	07H	Forced operation element 8	0EH	Forced operation element 15
01H	Forced operation element 2	08H	Forced operation element 9	0FH	Forced operation element 16
02H	Forced operation element 3	09H	Forced operation element 10	10H	Forced operation element 17
03H	Forced operation element 4	0AH	Forced operation element 11	11H	Forced operation element 18
04H	Forced operation element 5	0BH	Forced operation element 12	12H	Forced operation element 19
05H	Forced operation element 6	0CH	Forced operation element 13	13H	Forced operation element 20
06H	Forced operation element 7	0DH	Forced operation element 14	14H	Forced operation element 21

For more information about the forced operation elements, see the MELPRO-D Series Protection Relay CC-COM Communication Card User Manual (model-specific information) (JEPO-IL 9336).

3.5.25 Forced operation set end command

B6H	**Forced operation set end**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will enable the setting specified with the command B5H.

Remote register RWwm

	b15	b0
m	00H	B6H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

3.5.26 Waveform initial setting command

B9H	**Waveform initial setting**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will enable the waveform initial setting.

Remote register RWwm

	b15	b0
n	Save cycle count after operation	B9H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Save cycle count after operation

How many cycles of waveform data to be accumulated after operation should be set. Example : 56 cycles → 38H

The setting range requires 10 to 224 cycles.

3.5.27 CTVT ratio setting command

BAH	**CTVT ratio setting**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the exactly same data as what was sent as the setting. The sequence program should be so designed that a set end command (B3H) will be issued when the setting data sent and the setting data received are compared to be found identical. The comparison should be programmed in the sequence of the master station.

Remote register RWwm

	b15	b0
m	Channel number	BAH
m+1	Medium order data	Lower order data
m+2	00H	Higher order data
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Channel number	BAH
n+1	Medium order data	Lower order data
n+2	00H	Higher order data
n+3	00H	00H

For the channel number and data, see the CTVT ratio monitoring command (97H).

3.5.28 Ry Password setting

BCH	**Ry Password setting**

Write the following command and related data into the remote register “RWw”, then switch the command execution request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will enable the Ry password setting.

Note): About this setting, there is no command of setting end.

Remote register RWwm

	b15	b0
m	Lower order password data	BCH
m+1	00H	Higher oder password data
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Higher order/Lower order password data : Hexadecimal data (each digit: 0～F)

3.5.29 Ry Password Ena./Dis. setting

BFH	**Ry Password Ena./Dis. setting**

Write the following command and related data into the remote register “RWw”, then switch the command execution request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will enable the Ry password Ena./Dis. setting.

Note): About this setting, there is no command of setting end.

Remote register RWwm

	b15	b0
m	Order data	BFH
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Order data : [0] Disable, [1] Enable

3.5.30 Time information set command

D0H	**Time information set**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will set the time information.

Remote register RWwm

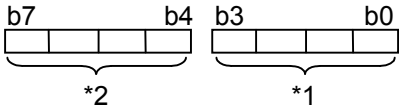
	b15	b0
m	Higher order year data	D0H
m+1	Lower order year data	Month data
m+2	Date data	Hour data
m+3	Minute data	Second data

Remote register RWrn

	b15	b0
n	00H	00H
n+1	00H	00H
n+2	00H	00H
n+3	00H	00H

m, n : address allocated by channel setting

Data configuration



< Description >

Higher order year data : Put the second digit of the two higher digits of a year of Christ in the bits *2.
Put the first digit of the two higher digits of a year of Christ in the bits *1.

Lower order year data : Put the second digit of the two lower digits of a year of Christ in the bits *2.
Put the first digit of the two lower digits of a year of Christ in the bits *1.

Month : Put the second digit of month data in the bits *2 (“0” for January to September).
Put the first digit of month data in the bits *1.

Date : Put the second digit of date data in the bits *2 (“0” for 1st to 9th).
Put the first digit of date data in the bits *1.

Hour : Put the second digit of hour data in the bits *2 (“0” for 1 to 9 o’clock).
Put the first digit of hour data in the bits *1.

Minute : Put the second digit of minute data in the bits *2 (“0” for 1 to 9 minutes).
Put the first digit of minute data in the bits *1.

Second : Put the second digit of second data in the bits *2 (“0” for 1 to 9 seconds).
Put the first digit of second data in the bits *1.

<Example>

Higher order year data : Data = 19H (19XX); Data = 20H (20XX)

Lower order year data : Data = 98H (XX98); Data = 01H (XX01)

Month : Data = 06H (June); Data = 12H (December)

Date : Data = 03H (3rd); Data = 24H (24th)

Hour : Data = 07H (7 o’clock); Data = 19H (19 o’ clock)

Minute : Data = 08H (8 min.); Data = 48H (48 min.)

Second : Data = 01H (1 sec.); Data = 33H (33 sec.)

3.5.31 Time monitoring command

D3H	**Time monitoring**

Write the following command and related data in the remote register “RWw”, then switch the command execute request flag to “1” (ON). When the command end response flag becomes “1” (ON), this means that the remote register “RWr” has been received. Reading data of the register will obtain the current time information of the remote device station.

Remote register RWwm

	b15	b0
m	00H	D3H
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

Remote register RWrn

	b15	b0
n	Higher order year data	00H
n+1	Lower order year data	Month data
n+2	Date data	Hour data
n+3	Minute data	Second data

m, n : address allocated by channel setting

For data, see the section of the time information setting (D0H).

3.6 Error code

When a set of command and data sent to the MELPRO-D relay unit shows an error, a response of error code as shown in the table below will be sent back:

Error code	Error	Remedy
E1	An undefined command that is not catalogued in MELPRO-D is specified.	Carry out setting again.
E3	A channel or phenomenon number that is not catalogued in MELPRO-D is specified.	Carry out setting again.
E4	The time setting exceeds the specified setting range.	Carry out setting again.
E6	Setting range error other than time setting error.	Carry out setting again.
E7	A phenomenon for which no trip has occurred is selected.	Carry out setting again.
E8	Man-machine is being setting.	Wait until man-machine operation finishes.
E9	The operational procedure is not correct.	Carry out setting again.
EA	The waveform initial setting is not correct.	Carry out setting again.
EB	Another PC is downloading the waveform.	Wait for end of the other PC download.

When a error occurs, the error code will be written into remote register RWrn, and the following status change are implemented:

RX (m+1) A (Error status flag) → 1 (Error occurring status)

RX (m+1) B (Remote READY) → 0 (Original inter-transmission stopping status)

If you want to cancel the error status, please set RY (m+1) A “1” (ON).

Note): If holding the error status continuously, it possibly occurs again that

RX (m+1) A (Error status flag) → 1 (Error occurring status)

Remote register RWrn

	b15	b0
m	00H	Error code
m+1	00H	00H
m+2	00H	00H
m+3	00H	00H

n : address allocated by channel setting

3.7 Communication LED

The following describes the communication LED located on the front panel of the MELPRO-D relay unit:

RUN	Communication	Status	Remedy
On	On	The communication card is installed and at least one of the following conditions has occurred: (1) Disconnected from the master station. (2) Connected with the master station, but the sequencer CPU switch is in a position other than “RUN”. (3) The sequencer CPU switch in the master station is in “RUN”, but the sequencer CPU has failure. (4) Connection with the master station broke during communication (with the LED blinking). (5) The power switch in the master station is off.	(1) Connect to the master station. (2) Move the sequencer CPU switch to “RUN”. (3) Move the switch to “RESET” once and then to “RUN”. (4) Check the connection. (5) Turn the power switch in the master station on.
	Blink	Under communication. The sequencer CPU is normal and the switch is in “RUN”.	-
	Off	(1) The communication card is not installed. (2) The communication card has self-diagnosis error. (3) An inappropriate baud rate is selected. (4) An inappropriate channel is selected.	(1) Install the communication card. (2) Shift the power switch of the relay unit from OFF to ON. Where the system is so designed to allow reading self-diagnosis result through communication, check the result. (3) Check the baud rate setting. (4) Check the channel setting.
Off	On	The MELPRO-D relay unit has self-diagnosis error. A transmission error has occurred between master station and communication card. (Note 1)	Shift the power switch of the relay unit from OFF to ON. Where the system is so designed to allow reading of self-diagnosis result through communication, check the result.
	Blink	The MELPRO-D relay unit has self-diagnosis error, but communication is still going on.	Shift the power switch of the relay unit from OFF to ON. Where the system is so designed to allow reading of self-diagnosis result through communication, check the result.
	Off	(1) The power switch of the MELPRO-D relay unit is off. (2) Both the MELPRO-D relay unit and communication card have monitoring error. (3) The MELPRO-D relay unit has monitoring error and the communication card is not installed.	(1) Turn the power switch on. (2) Shift the power switch of the relay unit from OFF to ON. (3) Shift the power switch of the relay unit from OFF to ON. Where the system is so designed to allow reading of self-diagnosis result through communication, check the result.

(Note 1) For the self-diagnosis items in the relay unit, see the relay unit operation manual.

3.8 Self-diagnosis

The following shows the self-diagnosis items:

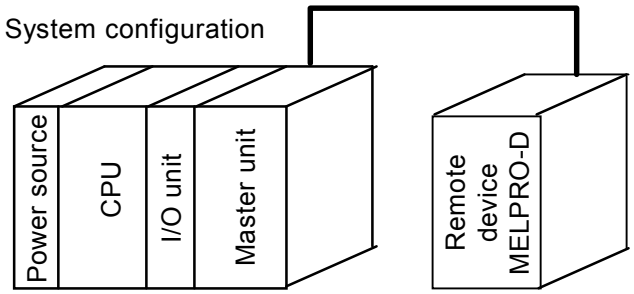
Self-diagnosis items	Check point	Matching	If detected	LED
Known fixed operation check	Four fundamental operations check	3 times	WDT is output. Communication becomes disabled.	Off
Stack area memory check	Stack area read/write check	3 times		
Memory check	Data area read/write check	3 times		
Stack check	Stack area check	3 times		
SUM check	Garbled program code check	3 times		

4 Sequence program sample

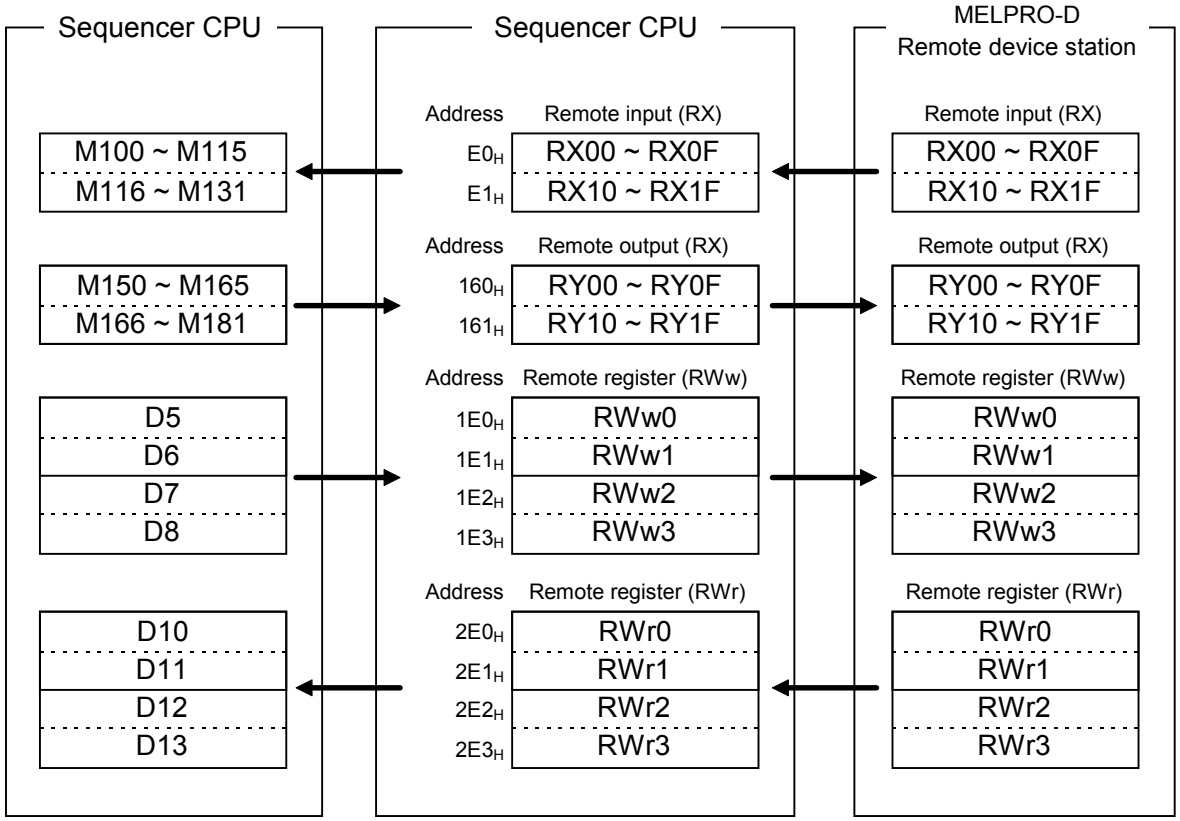
The following explains how to execute each command.

The example of sequence program indicated in this section is based on the system shown in the figure below.

For the sequence program for the total CC-Link system, see the CC-Link Master Unit User Manual (detailed information).

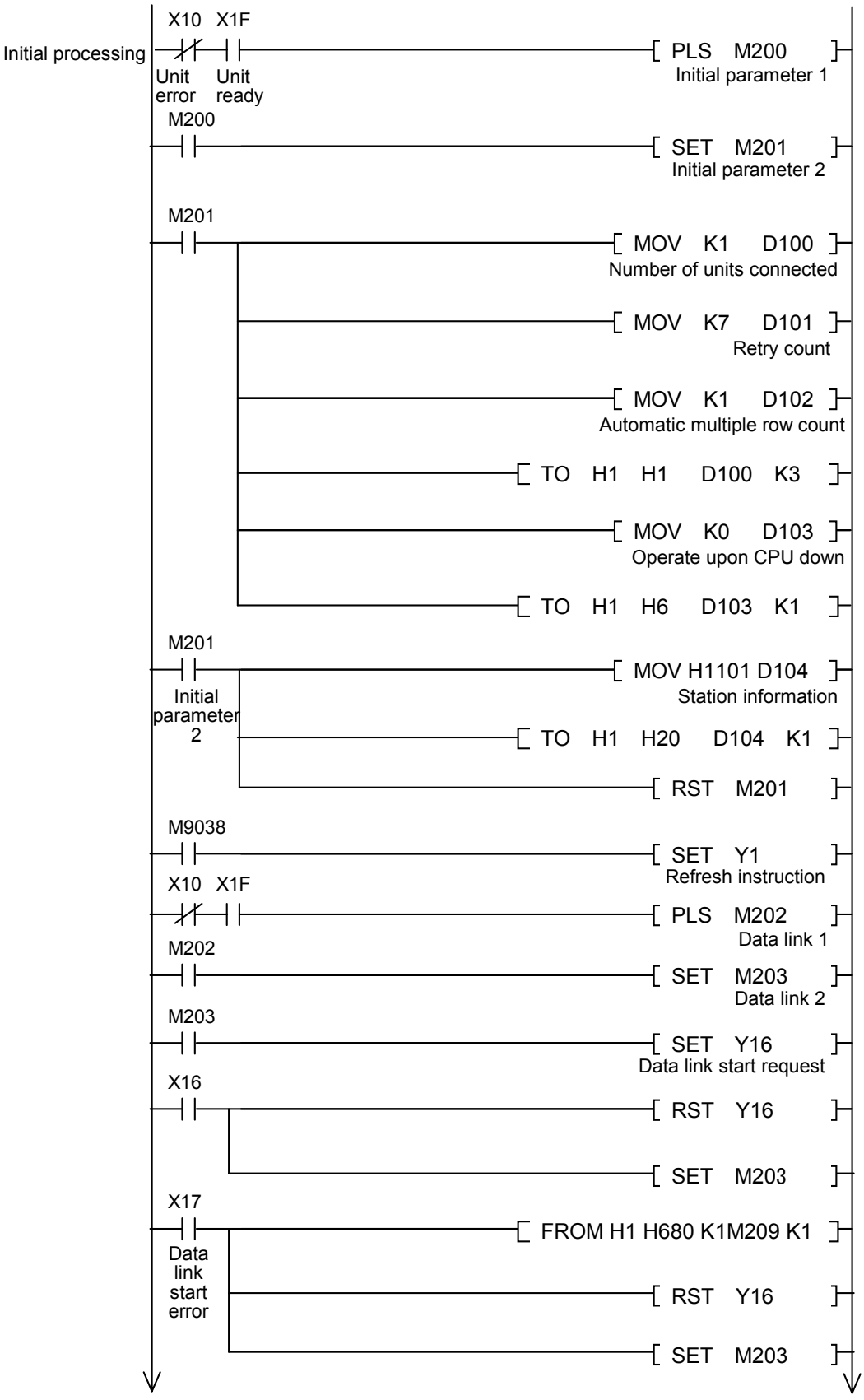


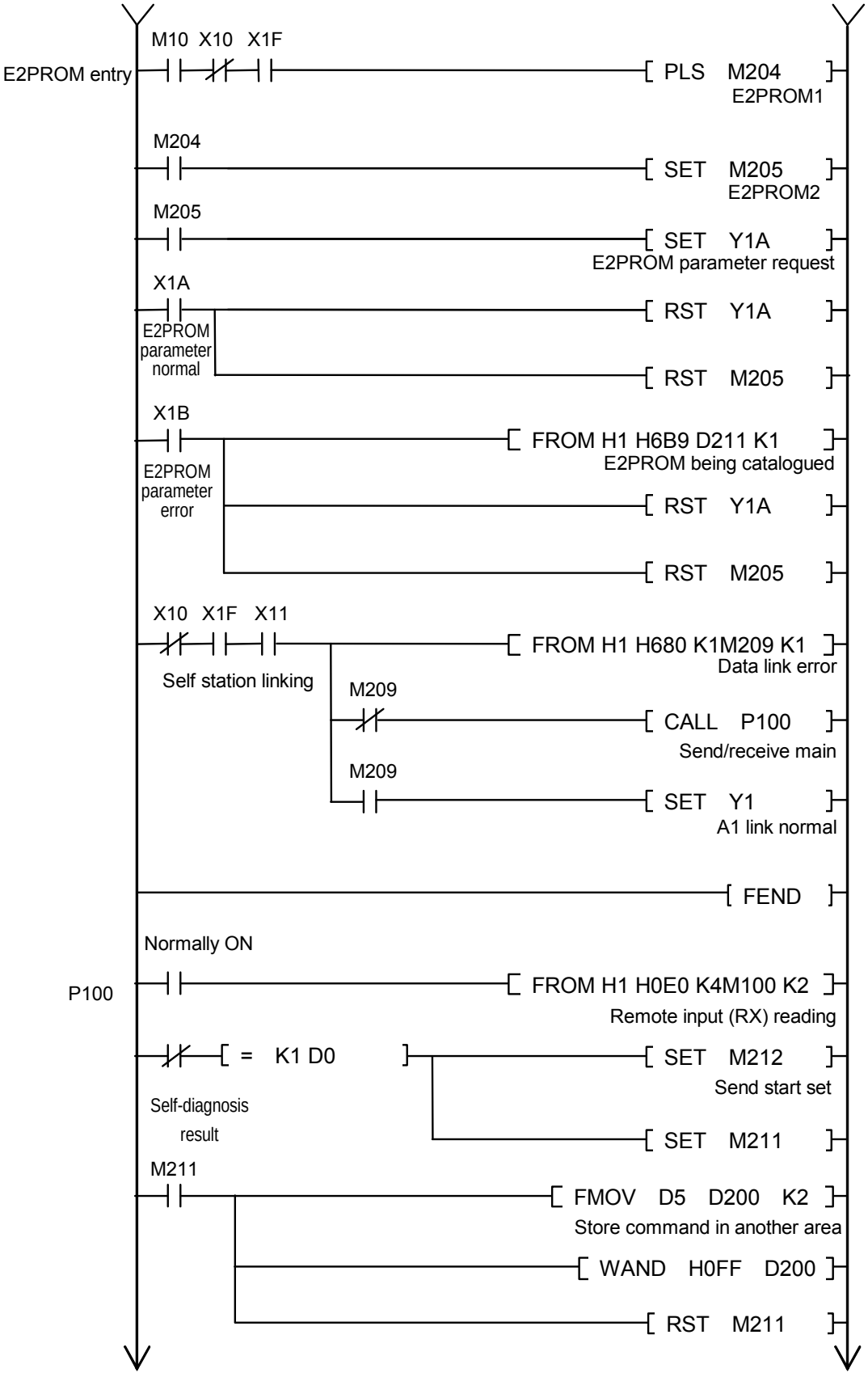
Relationship among sequencer CPU, master station buffer memory and remote device station

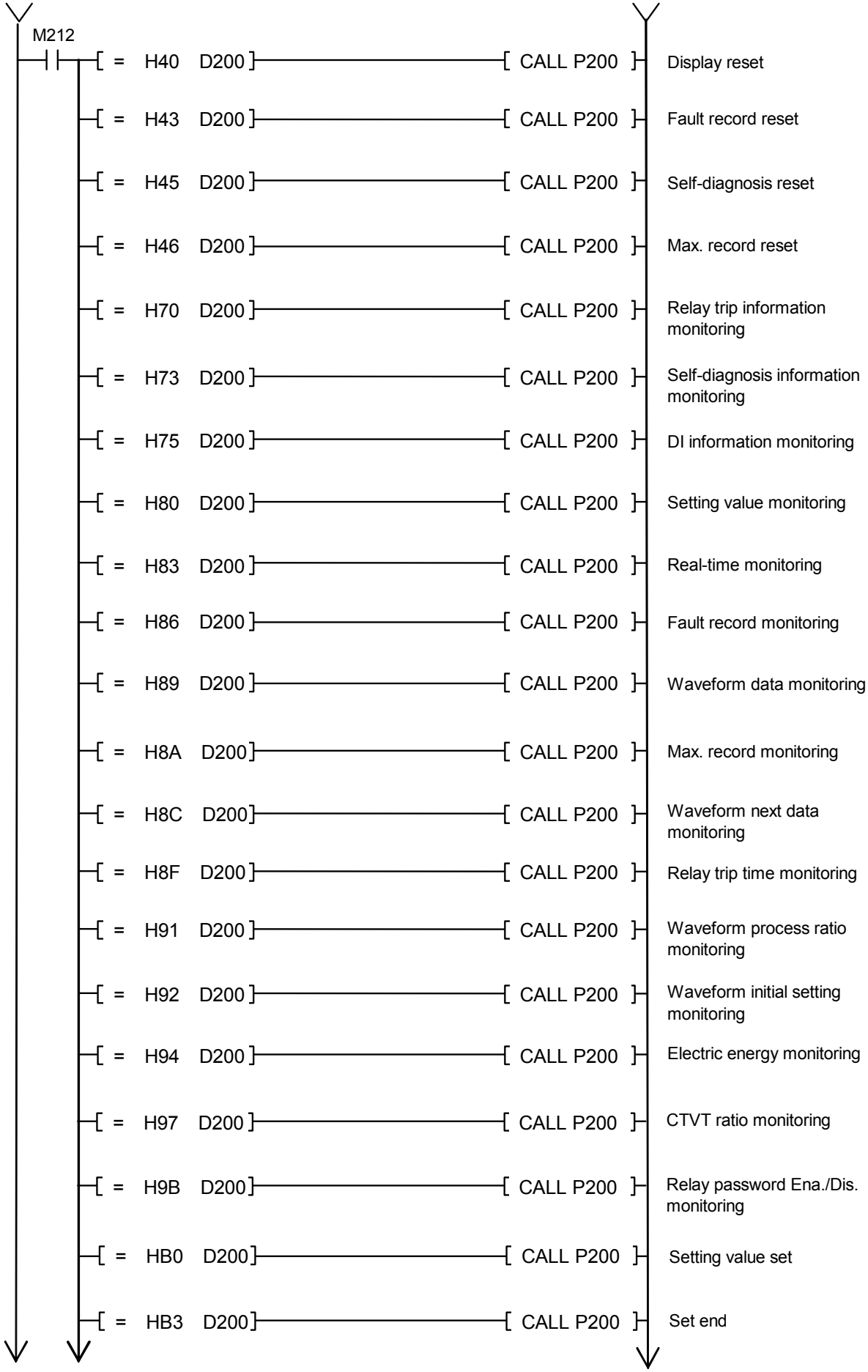


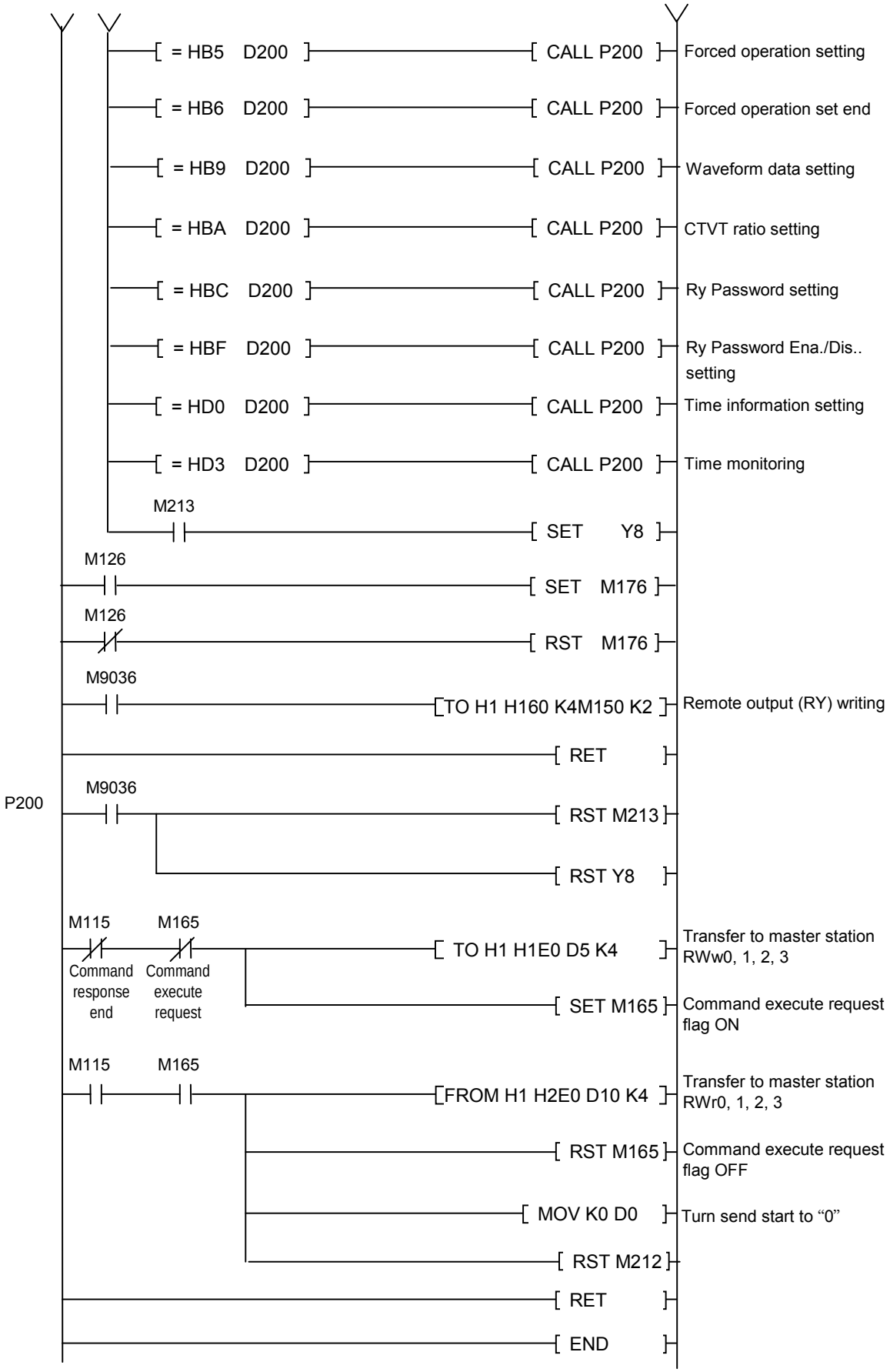
4.1 Sequence program sample

For the CC-Link parameter setting program, see the Master Unit User Manual (detailed information).




M10 X10 X1F
E2PROM entry
PLS M204
E2PROM1
M204
SET M205
E2PROM2
M205
SET Y1A
E2PROM parameter request
X1A
RST Y1A
E2PROM parameter normal
RST M205
X1B
FROM H1 H6B9 D211 K1
E2PROM being catalogued
E2PROM parameter error
RST Y1A
RST M205
X10 X1F X11
FROM H1 H680 K1M209 K1
Data link error
Self station linking
M209
CALL P100
Send/receive main
M209
SET Y1
A1 link normal
FEND
Normally ON
P100
FROM H1 H0E0 K4M100 K2
Remote input (RX) reading
= K1 D0
SET M212
Send start set
Self-diagnosis result
SET M211
M211
FMOV D5 D200 K2
Store command in another area
WAND H0FF D200
RST M211


M212
[= H40 D200]
[CALL P200]
Display reset
[= H43 D200]
[CALL P200]
Fault record reset
[= H45 D200]
[CALL P200]
Self-diagnosis reset
[= H46 D200]
[CALL P200]
Max. record reset
[= H70 D200]
[CALL P200]
Relay trip information monitoring
[= H73 D200]
[CALL P200]
Self-diagnosis information monitoring
[= H75 D200]
[CALL P200]
DI information monitoring
[= H80 D200]
[CALL P200]
Setting value monitoring
[= H83 D200]
[CALL P200]
Real-time monitoring
[= H86 D200]
[CALL P200]
Fault record monitoring
[= H89 D200]
[CALL P200]
Waveform data monitoring
[= H8A D200]
[CALL P200]
Max. record monitoring
[= H8C D200]
[CALL P200]
Waveform next data monitoring
[= H8F D200]
[CALL P200]
Relay trip time monitoring
[= H91 D200]
[CALL P200]
Waveform process ratio monitoring
[= H92 D200]
[CALL P200]
Waveform initial setting monitoring
[= H94 D200]
[CALL P200]
Electric energy monitoring
[= H97 D200]
[CALL P200]
CTVT ratio monitoring
[= H9B D200]
[CALL P200]
Relay password Ena./Dis. monitoring
[= HB0 D200]
[CALL P200]
Setting value set
[= HB3 D200]
[CALL P200]
Set end

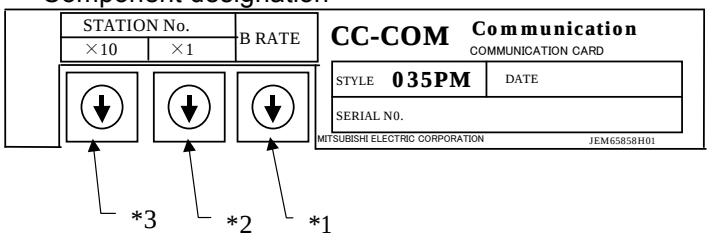


The program shown above is an example of the system configuration, Section 4. For programming, see the CC-Link Master Unit User’s Manual and the Programming Manual, etc.

5 Component designation and setting

This chapter describes the parts and setting of the communication card. For the component names and settings of the MELPRO-D relay unit, see the MELPR-D relay unit operation manual.

5.1 Component designation



*1 CC-Link baud rate setting switch

Setting	Baud rate
0	156 Kbps
1	625 Kbps
2	2.5 Mbps
3	5 Mbps
4	10 Mbps

*2 CC-Link channel number (the one place) setting switch

Setting	Channel number
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

*3 CC-Link channel number (the ten place) setting switch

Setting	Channel number
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

5.2 Switch setting

(1) Setting baud rate

The setting switch indicated in the previous section is used to set the baud rate. The numbers 0 to 4 are allowed in setting. Setting any other number will cause an error. Error will also occur when you try to change the setting under normal operation.

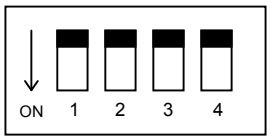
The baud rate set here must be identical to the baud rate set in the master station.

(2) Setting channel number

The setting switches indicated in the previous section are used in combination to set the channel number. When a combination of the one and ten places represents “0” or over “65”, an error should occur. Error will also occur when you try to change the setting under normal operation.

For more information about this setting, see the master unit user manual.

Caution: The switches (S4) mounted on the back of the channel number (the ten place) setting switch should be all set in the “OFF” positions.



6 Installation and wiring

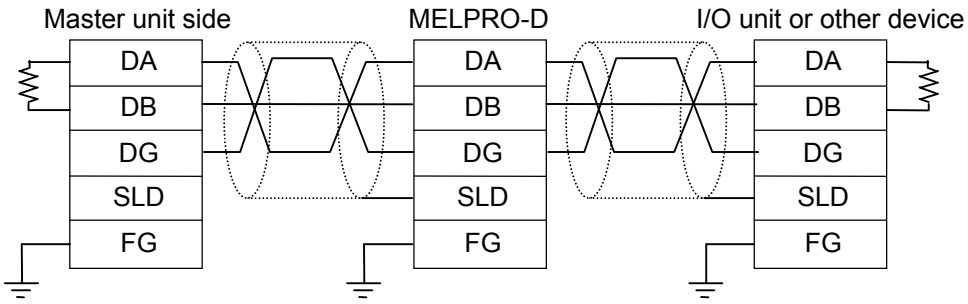
This chapter describes the precautions in handling MEPRO-D.

6.1 Installation of relay unit

See the MELPRO-D relay unit operation manual.

6.2 Wiring

(1) Twist pair cables connecting MELPRO-D to the master or other unit should be wired as follows:



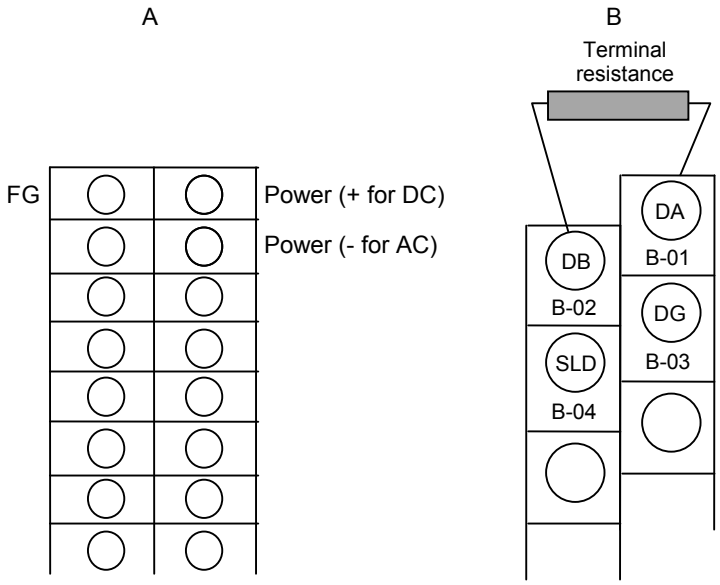
SLD is internally connected to FG in each unit.

For further information, see the master unit user manual.

(2) Where MELPRO-D is a terminal station:

When MELPRO-D is a terminal station, a terminal resistance should be wired to the following positions:

Or, please set it with the switch installed on the communication card of the end bureau.



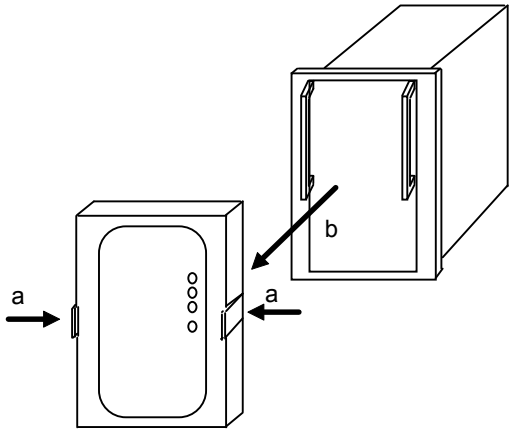
6.3 How to install communication card

6.3.1 Communication card installation procedure

(1) Removing the front cover

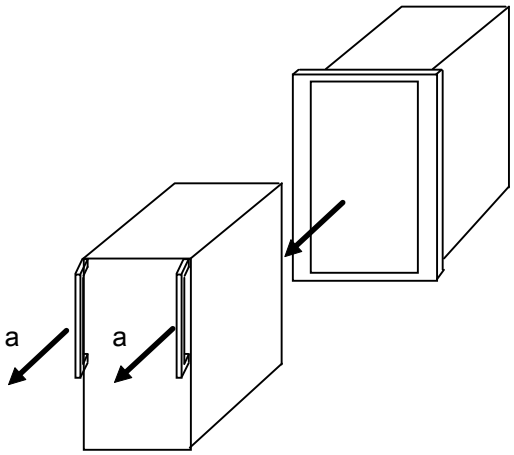
a : Push the latches located on the both sides of the front cover.

b : While pushing the latches, pull the cover toward you.



(2) Pulling the unit out of the case

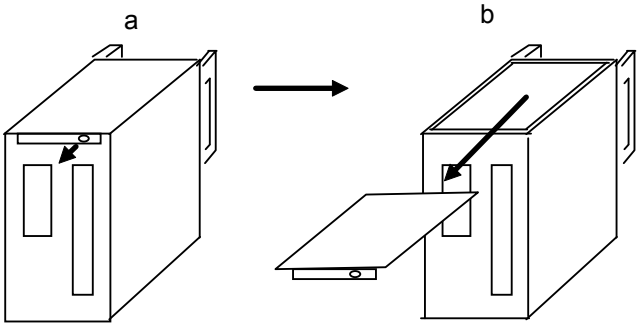
a : Grasp the handles of the unit and pull them toward you.



(3) Removing the electromagnetic shielding cover located on the top of the unit removed

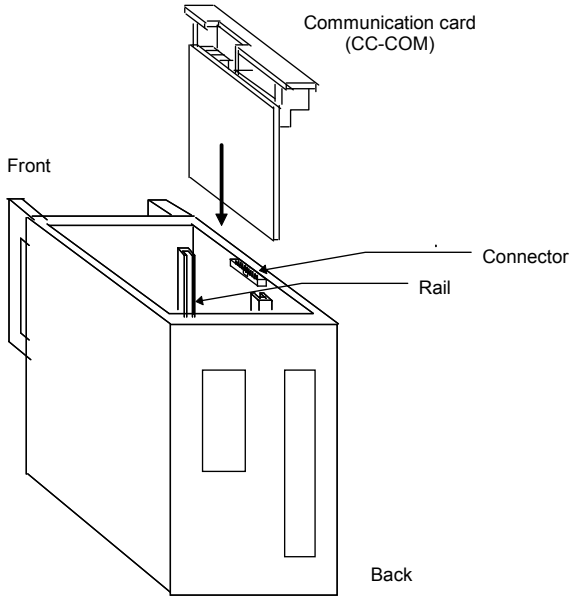
a : Remove a screw on the back of the unit you pulled out.

b : Remove the electromagnetic shielding cover by sliding it over the unit in the direction of the arrow.

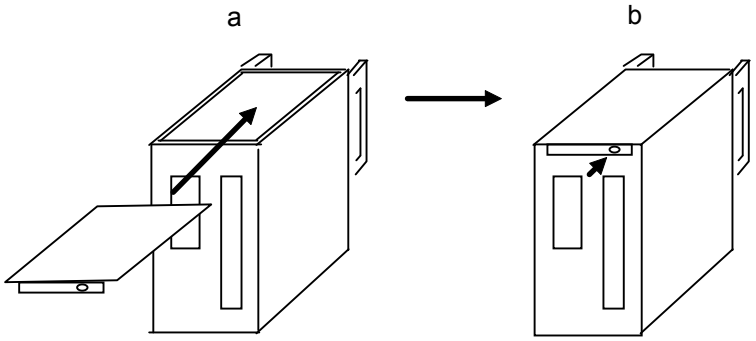


(4) Inserting the communication card

a : Fit the communication card in the rails made inside the unit. Slide the card down in the direction of the arrow until the connection between the card and the connector is established. Be sure to push the card down until the nameplate of the communication card is flush with the top of the unit frame.



(5) Installing the electromagnetic shielding cover to the top of the unit

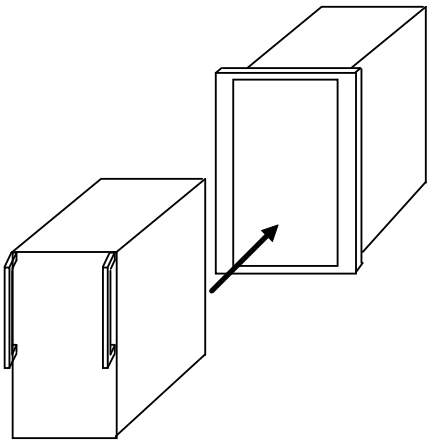


a : Fit the electromagnetic shielding cover in the rails on the top of the unit. Insert the cover fully enough to have no clearance.

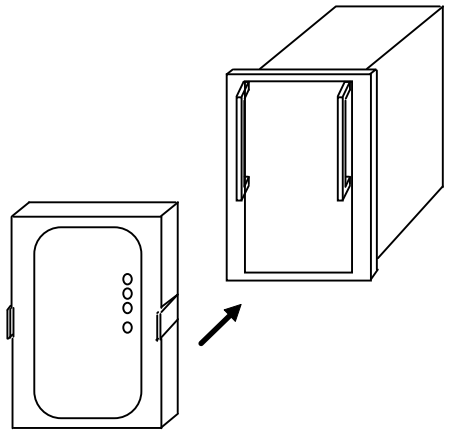
b : Secure the screw in the position indicated with the arrow.

(6) Installing the unit into case

Grasp the handles of the unit to push the unit into the case until the front surface of the unit is flush with the front frame surface of the case.



(7) Installing the front cover



Put the cover on the unit, so that you will hear a click sound when the latches on the both sides of the cover are engaged with the unit.

(8) Turn the MELPRO-D power switch on.

(9) Make sure that the communication LED lamp on the front panel of MELPRO-D lights up.

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