

ADVANCED AND EVER ADVANCING **MITSUBISHI ELECTRIC**

MITSUBISHI

PROGRAMMABLE CONTROLLERS
MELSEC-F

USER'S MANUAL

FX₂N-485-BD COMMUNICATION BOARD

FX₂N



Foreword

- This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX_{2N}-485-BD COMMUNICATION BOARD. It should be read and understood before attempting to install or use the unit.
Further information can be found in the FX PROGRAMMING MANUAL, FX_{2N} series hardware manuals and manual of FX-485PC-IF USER'S MANUAL.
- If in doubt at any stage during the installation of the FX_{2N}-485-BD COMMUNICATION BOARD always consult a professional electrical engineer who is qualified and trained to the local and national standards.



FX₂N-485-BD COMMUNICATION BOARD

USER'S MANUAL

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Guidelines for the safety of the user and protection of the FX_{2N}-485-BD COMMUNICATION BOARD.

This manual provides information for the installation and use of the FX_{2N}-485-BD COMMUNICATION BOARD. The manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows;

- a) Any engineer who is responsible for the planning, design and construction of automatic equipment using the product associated with this manual should be of a competent nature, (trained and qualified to the local and national standards required to fulfill that role). These engineers should be fully aware of safety with regards to automated equipment.
- b) Any commissioning or service engineer must be of a competent nature, trained and qualified to the local and national standards required to fulfill that job. These engineers should also be trained in the use and maintenance of the completed product. This includes being completely familiar with all associated documentation for the said product. All maintenance should be carried out in accordance with established safety practices.
- c) All operators of the compliance product should be trained to use that product in a safe and coordinated manner in compliance to established safety practices. The operators should also be familiar with all documentation which is connected with the actual operation of the completed equipment.

Note: The term 'completed equipment' refers to a third party constructed device which contains or uses the product associated with this manual.

Note's on the symbology used in this manual

At various times through out this manual certain symbols will be used to highlight points of information which are intended to ensure the users personal safety and protect the integrity of the equipment. Whenever any of the following symbols are encountered, its associated note must be read and understood. Each of the symbols used will now be listed with a brief description of its meaning.

Hardware warnings



1) Indicates that the identified danger **WILL** cause physical and property damage.



2) Indicates that the identified danger **POSSIBLY** cause physical and property damage.



3) Indicates a point of further interest or further explanation.

Software warnings



4) Indicates special care must be taken when using this element of software.



5) Indicates a special point of which the user of the associate software element should be aware.



6) Indicates a point of interest or further explanation.

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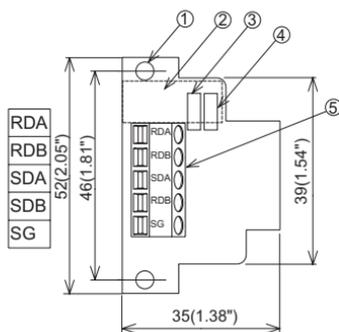
1. INTRODUCTION

The communication board FX_{2N}-485-BD for RS485 (hereinafter referred to as "485BD") can be connected to the base unit of the FX_{2N} Series PC to be used for the following applications.

- (1) Data transfer using the no protocol
Data communication with diversified RS232C units including personal computers, bar code readers and printers can be performed via the RS485 (422) converter using the no protocol. In this application, data is sent or received using the data registers specified by the RS instruction because the 485BD does not have a buffer memory. For the setting and program examples, refer to Chapters 5 and 6. For the RS instruction, refer to the FX Programming Manual.
- (2) Data transfer using the dedicated protocol
Data transfer with RS485 (422) units can be performed on the 1:N basis using the dedicated protocol. For the contents of the dedicated protocol used in this application, refer to the FX-485PC-IF User's Manual.
- (3) Data transfer using the parallel link
Data transfer with an FX_{2N} programmable controller can be performed on the 1:1 basis for 100 auxiliary relays and 10 data registers. For the setting and program examples, refer to Chapter 7.
- (4) Data transfer using the N:N network
Data transfer with FX_{2N} programmable controllers can be performed on the N:N basis. For the setting, the number of transferred data and program examples, refer to Chapter 8.

1.1 External Dimensions

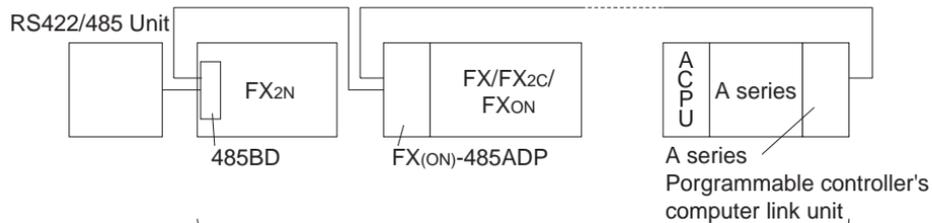
Dimensions : mm (inches) Accessory : M3 self-tapping screws × 2,
Terminal resistor 330 Ω × 2 110 Ω × 1



- ① Mounting holes (2- φ4.0(0.16"))
- ② Connector for programmable controller
- ③ SD LED : Flashes at high speed during sending.
- ④ RD LED : Flashes at high speed during sending.
- ⑤ Terminals to connect RS485 unit
The top face of this terminal block is higher than the top face of the panel cover of the programmable controller by approximately 7 mm.

1.2 System Configuration

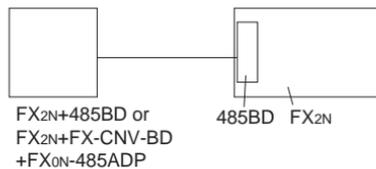
1.2.1 When Use No Protocol or Dedicated Protocol



When use 485BD in the system, total extension distance 50m. (No use : max. 500m)

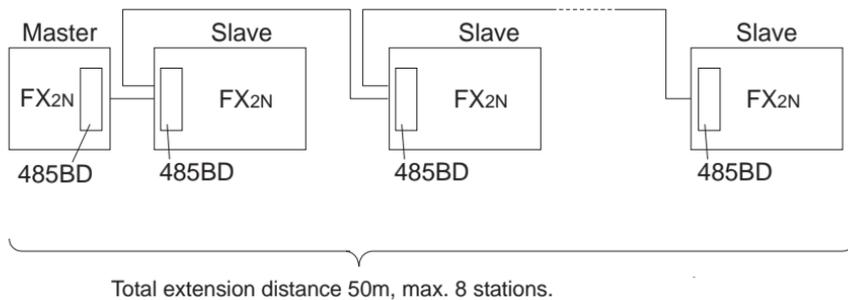
When use dedicated protocol, max. 16 stations including A series programmable controller.

1.2.2 When Use Parallel Link



When use 485BD in the system, this distance 50m. (No use : max. 500m)

1.2.3 When Use N:N Network

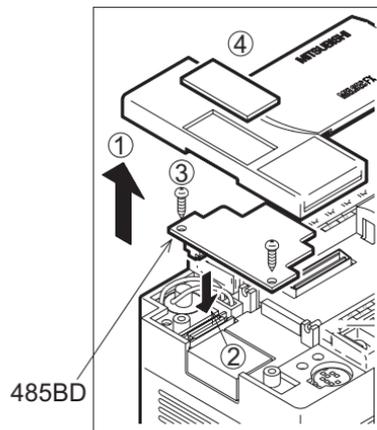


2. MOUNTING AND WIRING

2.1 Mounting Procedure

Turn off the power of the programmable controller, and mount the 485BD using the following procedure.

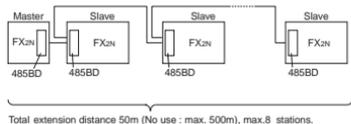
- ① Remove the panel cover from the top face of the base unit.
- ② Connect the connector for programmable controller provided on the 485BD to the board mounting connector provided on the base unit.
- ③ Fix the 485BD to the base unit using the M3 self-tapping screws supplied.
- ④ Remove the cut out on the left of the panel cover using a tool such as nippers or cutters so that the terminal block can. The top face of this terminal block is higher than the top face of the panel cover of the programmable controller by approximately 7 mm.



2.2 Cable and Terminal Resistor

2.2.1 Cable

To connect the RS485 (422) unit, use a shielded twist-pair cable. The cable model must be the AWG 26 to 16, and the maximum tightening torque must be 0.6 Nm (6 kgf•cm). If a cable other than the AWG 26 to 16 is used, normal communication cannot be assured because the terminal may be imperfectly contacted. It is recommended to insert a cable integrated by the crimping tool into the terminal.



2.2.2 Selection of Wiring

- (1) When two-pair wiring is required.
 - 1) When an RS422 unit is connected.
 - 2) When N:N network no use.
 - 3) When the dedicated protocol is used and high speed response is required (when the transmission sentence wait time is required to be 70 ms or less).
For the transmission sentence wait time, refer to the users manual of the FX-485PC-IF.
 - 4) When the on-demand function of the dedicated protocol is used.
However, the RS485/422 unit must be connected to the 485BD on the one-to-one basis.
 - 5) When wiring is added to the system which has been already constructed using two-pair wiring.
- (2) When one-pair wiring is required.
 - 1) When wiring is added to the system which has been already constructed using one-pair wiring.
 - 2) When N:N network use.
 - 3) When two-pair wiring is not necessary.

2.2.3 Terminal Resistor

Provide the terminal resistor at the both ends of the line as described in Paragraphs 2-3 and 2-4.

- 1) In the case of two-pair wiring, connect the terminal resistor (330 Ω , 1/4 W) between terminals SDA and SDB as well as between terminals RDA and RDB. Use the resistors offered as accessories of the 485BD.
- 2) In the case of one-pair wiring, connect the terminal resistor (110 Ω , 1/2 W) between terminals RDA and RDB. Use the resistors offered as accessories of the 485BD.

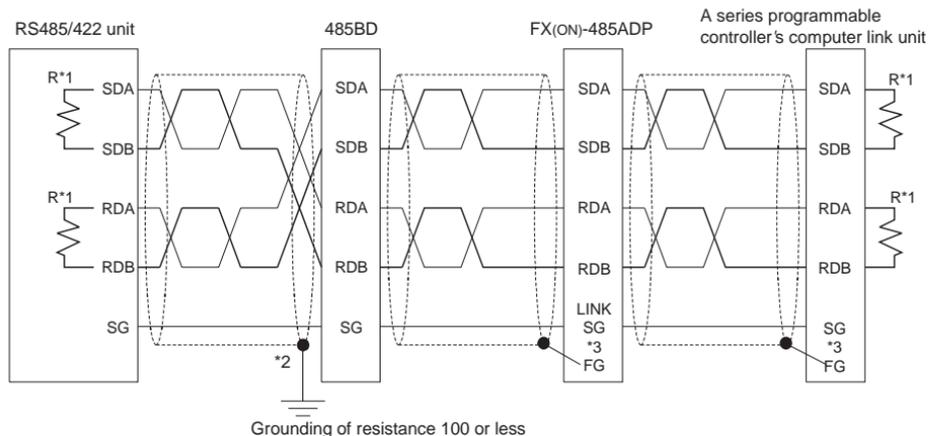
Orange Orange Brown



Brown Brown Brown

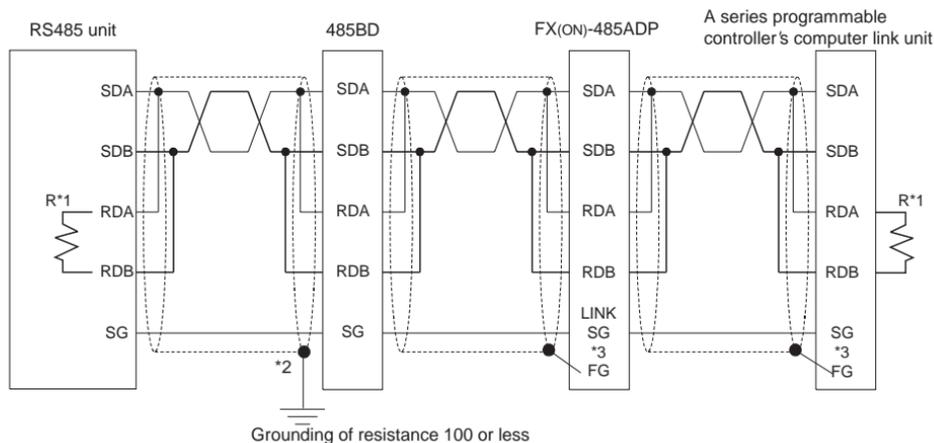


2.2.4 Two-pair Wiring



- *1 R is the terminating resistance. Connect the terminating resistance (330 Ω) between terminals SDA and SDB, and terminals RDA and RDB.
- *2 Shield of connect the 485BD to shielded twist-pair cable must be connected to ground (100 Ω or less). When use parallel link, ground both side. When use no protocol or dedicated protocol, ground one side.
- *3 Connect terminal FG to each terminal of the programmable controller main body grounded with resistance of 100 Ω or less. However, as for the computer link unit of the A series programmable controller, see the manual of the computer link unit.
- *4 When use RS232/485 or RS232/422 adapter, please the adapter use FX-485PC-IF.

2.2.5 One-pair Wiring



- *1 R is the terminating resistance. Connect the terminating resistance (110 Ω) between terminals SDA and SDB.
- *2 Shield of connect the 485BD to shielded twist-pair cable must be connected to ground (100 Ω or less). When use parallel link, ground both side. When use no protocol or dedicated protocol, ground one side.
- *3 Connect terminal FG to each terminal of the programmable controller main body grounded with resistance of 100 Ω or less. However, as for the computer link unit of the A series PC, see the manual of the computer link unit.
- *4 When use RS232/485 or RS232/422 adapter, please the adapter use FX-485PC-IF.

3. SPECIFICATION

3.1 General Specification

General specifications is same as those for the FX_{2N} series programmable controller.

3.2 Power Supply Specification

5V DC, 60 mA is supplied as the power from the programmable controller.

3.3 Specification

| | |
|------------------------------|---|
| Transmission standard | Conforming to RS485 and RS422 |
| Transmission distance | Max. 50 m |
| LED indicators | SD, RD |
| Communication method | Half-duplex communication system |
| Protocol | Dedicated protocol (format 1 or format 4), No protocol, Parallel link, N:N network |
| Spoted baud rate | Dedicated protocol and no protocol : 300 ~ 19,200 (bps) Parallel link : 19,200 (bps) N:N network : 38,400 (bps) |
| Isolation | No isolation |

MEMO

4. COMMUNICATION FORMAT

This chapter contains diagnostic devices (related flags and data registers) and communication format use with no protocol and dedicated protocol communications. For details of the RS instruction, refer to the FX PROGRAMMING MANUAL. For details of the dedicated protocol, refer to the users manual of the FX-485PC-IF.

4.1 Related Flag and Data Registers

| Diagnostic devices | Operation |
|--------------------|--|
| M8121 | Data transmission delayed (RS instruction) |
| M8122 | Data transmission flag (RS instruction) |
| M8123 | Finished receiving data (RS instruction) |
| M8124 | Carrier detection flag (RS instruction) |
| M8126 | Global flag (dedicated protocol) |
| M8127 | On demand handshake flag (dedicated protocol) |
| M8128 | On demand error flag (dedicated protocol) |
| M8129 | On demand Byte/Word flag (dedicated protocol) |
| M8161 | Selection of 8 bit operations for applied instructions ASC, RS, ASCII, HEX, CCD (RS instruction) |

| Diagnostic devices | Operation |
|--------------------|---|
| D8120 | Communications format (RS instruction, dedicated protocol) |
| D8121 | Local station number (dedicated protocol) |
| D8122 | Amount of remaining data to be transmitted (RS instruction) |
| D8123 | Amount of remaining data already received (RS instruction) |
| D8124 | Data header <default STX (02H)> (RS instruction) |
| D8125 | Data terminator <default ETX (03H)> (RS instruction) |
| D8127 | On demand head device register (dedicated protocol) |
| D8128 | On demand data length register (dedicated protocol) |
| D8129 | Data network 'time-out' timer value (dedicated protocol) |

4.2 Communication Format D8120

To send and receive the data between the RS485 (422) unit using the 485BD, the communication format including the transmission speed (baud rate) and the parity must be consistent between the 485BD and the RS485 unit.

The communication format can be set using the parameters or the contents of the special data register D8120 of the FX_{2N} programmable controller. Make sure to set appropriately the communication format in accordance with the RS485 (422) unit used. For the setting method using the parameters of the FX_{2N} programmable controller, refer to the manual of the peripheral unit used.

Make sure to turn off the power of the programmable controller and turn it on again after modifying the setting.

| Bit No. | Meaning | Contents | |
|--|--------------------|---|--|
| | | 0 (OFF) | 1 (ON) |
| b0 | Data length | 7 bit | 8 bit |
| b1 b2 | Parity | b2,b1 (0, 0) : None (0, 1) : Odd | b2,b1 (1, 1) : Even |
| b3 | Stop bit | 1 bit | 2 bit |
| b4 b5 b6 b7 | Baud rate (bps) | b7,b6,b5,b4 (0, 0, 1, 1) : 300 (0, 1, 0, 0) : 600 (0, 1, 0, 1) : 1,200 (0, 1, 1, 0) : 2,400 | b7,b6,b5,b4 (0, 1, 1, 1) : 4,800 (1, 0, 0, 0) : 9,600 (1, 0, 0, 1) : 19,200 |

| Bit No. | Meaning | Contents | |
|------------|----------------------------------|-----------------------------|---------------------------------------|
| | | 0 (OFF) | 1 (ON) |
| b8 | Header character *1 | None | D8124 *2 |
| b9 | Terminator character *1 | None | D8125 *3 |
| b10 | Control line type I *4 | None | H / W |
| b11 | DTR check (Control line) *4 | Send and Receive | Receive |
| b12 | Control line type II *4 | None | H / W |
| b13 | Sum check *5 | Sum check code is not added | Sum check code is added automatically |
| b14 | Protocol | No protocol | Dedicated protocol |
| b15 | Transmission control protocol *5 | Protocol format 1 | Protocol format 4 |

*1 Make sure to set it to "0" when the dedicated protocol is used.

*2 It is effective exclusively when the no protocol (RS instruction) is selected, and the initial value is STX (02H: Can be modified by the user).

*3 It is effective exclusively when the no protocol (RS instruction) is selected, and the initial value is ETX (03H: Can be modified by the user).

*4 Make sure to set in to (b10, b11, b12) =(1, 1, 0) in the case of the no protocol (RS instruction), and (b10, b11, b12) = (0, 0, 0) in the case of the dedicated protocol.

*5 Make sure to set it to "0" when the no protocol is used.

4.2.1 Example Program of Setting

The communication format is set by special data register D8120. Setting the communication format using D8120 is effective only at the time the RS instruction is driven, and therefore if changed after driving, it is not actually accepted.

An example of setting D8120 is shown below.



H1B8E= 0001 1011 1000 1110 (binary)

The settings for the above program are as right.

| | |
|-----------------------------|---|
| Data length | 7 bit |
| Parity | Even |
| Stop bit | 2 bit |
| Baud rate | 9,600 bps |
| Protocol | No protocol |
| Header character | Use |
| Terminator character | Use |
| DTR check | Receive |
| Control line | H/W of type II use (Type I does not use) |

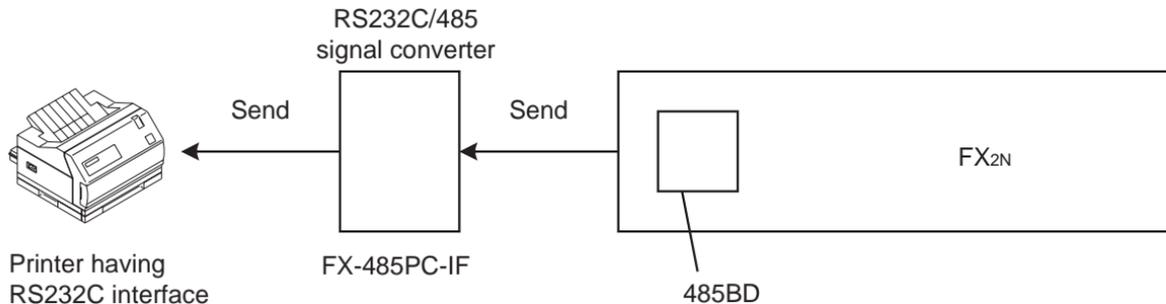
5. RS EXAMPLE PROGRAM

This example program use RS instruction.

5.1 Printer

When the printer having the RS232C interface is connected to the 485BD via the RS232C/485 signal converter (FX-485PC-IF), and the data sent from the programmable controller is printed

5.1.1 System Configuration



For communication between the printer and the FX-485PC-IF, use the cable which is consistent with the connector pin assignment of the printer used. For wiring between the FX-485PC-IF and the 485BD, refer to Section 2.

For the FX-485PC-IF, refer to the users manual of the FX-485PC-IF.

5.1.2 Communication Format

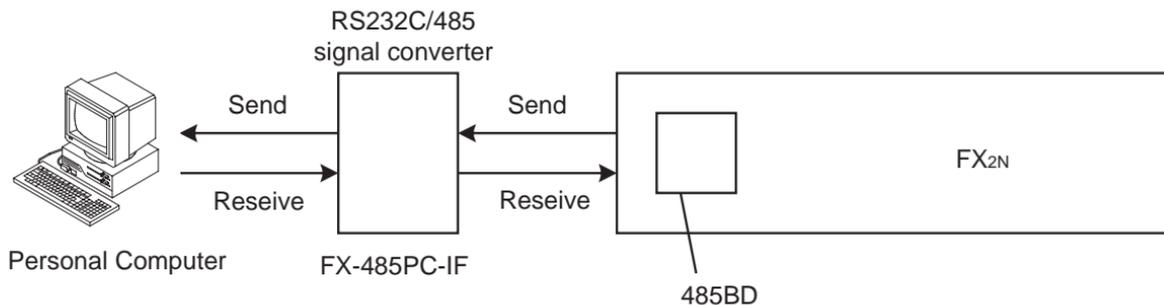
The communication format of the serial printer is as follows.

| | |
|-----------------------------|---|
| Data length | 8 bit |
| Parity | Even |
| Stop bit | 2 bit |
| Baud rate | 2,400 bps |
| Protocol | No protocol |
| Header character | Not use |
| Terminator character | Not use |
| DTR check | Receive |
| Control line | H/W of type II use (Type I does not use) |

5.2 Personal Computer

When the printer having the RS232C interface is connected to the 485BD via the RS232C/485 signal converter (FX-485PC-IF), and the data sent from the programmable controller is printed

5.2.1 System Configuration



For communication between the printer and the FX-485PC-IF, use the cable which is consistent with the connector pin assignment of the printer used. For wiring between the FX-485PC-IF and the 485BD, refer to Section 2.

For the FX-485PC-IF, refer to the users manual of the FX-485PC-IF

Note : Preparation of software

Use ordinary communication software (terminal emulator) or dedicated program in the personal computer.

5.2.2 Communication Format

The communication format of the programmable controller for this example is as follows.

If the communication format of the software can not be adjusted this setting, adjusted the programmable controller and the software to be the same.

| | |
|-----------------------------|---|
| Data length | 8 bit |
| Parity | Even |
| Stop bit | 2 bit |
| Baud rate | 2,400 bps |
| Protocol | No protocol |
| Header character | Not use |
| Terminator character | Not use |
| DTR check | Receive |
| Control line | H/W of type II use (Type I does not use) |

6. PARALLEL LINK

This section describes how to use the parallel link when the programmable controllers are connected on the 1:1 basis.

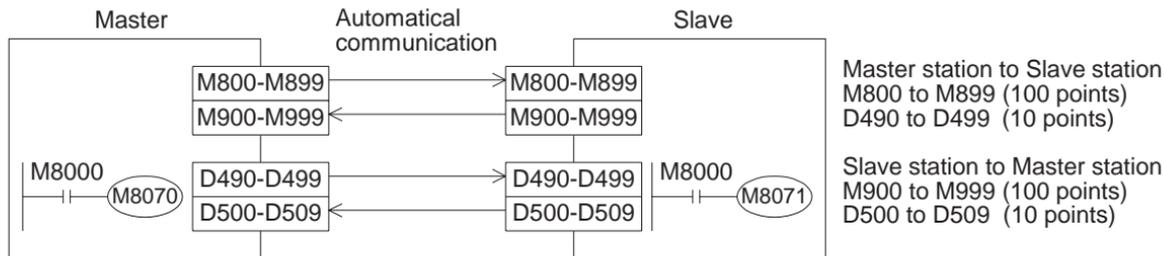
6.1 Parallel Link

The parallel link refers to the link with which the programmable controllers are connected each other by the wiring described in Chapter 2, and the data is automatically transferred between them using the special auxiliary relays.

6.2 Outline

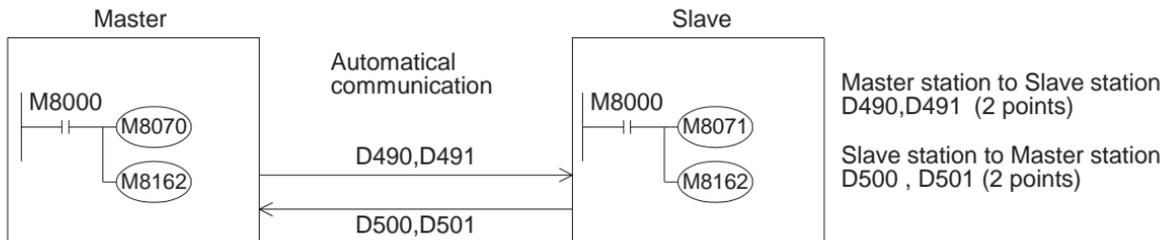
Two modes, the normal mode and the high speed mode, are offered for the parallel link. The special auxiliary relay M8162 recognizes the type of mode. The master station and the slave station are set by the special auxiliary relays M8070 and M8071.

6.2.1 Normal Mode (Special auxiliary relay M8162: OFF)



Time required for data transfer: 70 for reciprocation + Operation cycle of master station
+ Operation cycle of slave station (ms)

6.2.2 High Speed Mode (Special auxiliary relay M8162: ON)

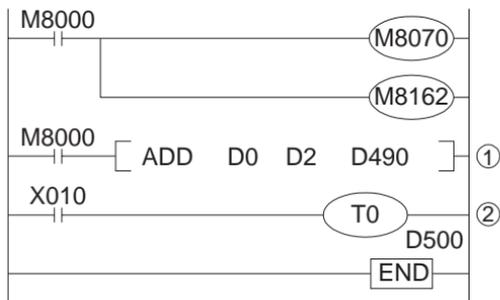


Time required for data transfer: 20 for reciprocation + Operation cycle of master station
+ Operation cycle of slave station (ms)

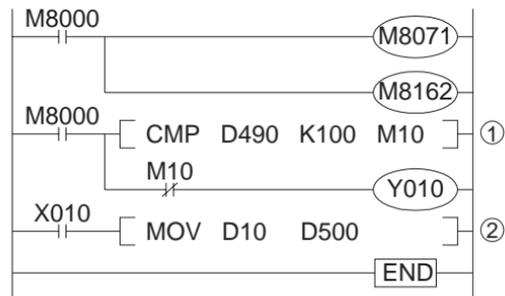
6.3.2 High Speed Mode

When the calculation result (D0 + D2) in the master station is 100 or less, the Y010 in the slave station is turned on (①). The D10 value in the slave station is set to the timer (T0) in the master station (②).

Master station



Slave station



7. N:N NETWORK

7.1 Outline

The N:N link is a network for up to eight FX_{2N} Series programmable controllers. In the network, data transfer is automatically performed among the programmable controllers for the devices determined in the refresh range. The devices in the refresh range can be monitored by all the stations. However, the data writing operation and the ON/OFF operation are enabled in its own station exclusively.

7.2 Related Flags and Data Registers

7.2.1 Special Auxiliary Relays

| Attribute | Special auxiliary relays | Name | Description | Response type |
|-----------|--------------------------|---------------------------------------|--|---------------|
| W | M8038 | N:N network parameter setting | Used to set N:N network parameters | M, L |
| R | M8063 | Network parameter error | When network parameter error is in master station, this is ON. | M, L |
| R | M8183 | Communication error of Master station | When communication error is in master station, this is ON. *1 | L |
| R | M8184 to M8190 *2 | Communication error of Slave station | When communication error is in slave station, this is ON. *1 | M, L |
| R | M8191 | Data communication | When communicate to other station, this is ON. | M, L |

R : Ready only W : Write only M : Master station L : Slave station

*1 The number of communication errors occurred in its own station cannot be counted in the CPU error status, the program error status or the stop status.

*2 No. in accordance with the slave station No.

Example: Slave station No. 1 is M8184, Slave station No. 2 is M8185,
Slave station No. 3 is M8186

7.2.2 Special Data Registers

| Attribute | Special data registers | Name | Description | Response type |
|-----------|------------------------|---|--|---------------|
| R | D8173 | Station No. | Saves its own station No. | M, L |
| R | D8174 | Total number of slave stations | Saves total number of slave stations | M, L |
| R | D8175 | Refresh range | Saves refresh range | M, L |
| W | D8176 | Station number setting | Sets its own station No. | M, L |
| W | D8177 | Total slave station number setting | Sets total number of slave stations | M |
| W | D8178 | Refresh range setting | Sets refresh range | M |
| W | D8179 | Retry count setting | Sets retry count | M |
| W | D8180 | Comms time-out setting | Sets comms time-out | M |
| R | D8201 | Current network scan time | Saves current network scan time | M, L |
| R | D8202 | Maximum network scan time | Saves maximum network scan time | M, L |
| R | D8203 | Number of communication error at master station | Number of communication error at master station *1 | L |
| R | D8204 to D8210 *2 | Number of communication error at slave station | Number of communication error at slave station *1 | M, L |
| R | D8211 | Code of communication error at master station | Code of communication error at master station | L |
| R | D8212 to D8218 *2 | Code of communication error at slave station | Code of communication error at slave station | M, L |

R : Ready only W : Write only M : Master station L : Slave station

*1 The number of communication errors occurred in its own station cannot be counted in the CPU error status, the program error status or the stop status.

*2 No. in accordance with the station No.

Example: Slave station No. 1 is D8204, D8212, Slave station No. 2 is D8205, D8213, Slave station No. 3 is D8206, D8214

7.3 Setting

Each setting for the N:N network becomes valid when the program is run or when the power of the programmable controller is turned on.

7.3.1 Setting the Station No. (D8176)

Set a value 0 to 7 to the special data register D8176.

| Set value | Decryption |
|-----------|---|
| 0 | Master station |
| 1 to 7 | Slave station No. Example : 1 is Slave station No. 1, 2 is Slave station No. 2 |

7.3.2 Setting the Total Number of Slave Stations (D8177)

Set a value 1 to 7 to the special data register D8177. (Default = 7)
This setting is not required for the slave station.

| Set value | Description |
|-----------|-----------------|
| 1 | 1 slave station |
| 2 | 2 slave station |
| : | : |
| 7 | 7 slave station |

7.3.3 Setting the Refresh Range (D8178)

Set a value 0 to 2 to the special data register D8178. (Default = 0)

This setting is not required for the slave station.

The devices used in each pattern are occupied by all the stations for the N:N network.

| Communication device | Refresh range | | |
|----------------------|---------------|-----------|-----------|
| | Pattern 0 | Pattern 1 | Pattern 2 |
| Bit device (M) | 0 point | 32 points | 64 points |
| Word device (D) | 4 points | 4 points | 8 points |

1) In the case of pattern 0

| Station No. | Device No. | |
|-------------|----------------|-----------------|
| | Bit device (M) | Word device (D) |
| | 0 point | 4 points |
| No. 0 | —— | D0 to D3 |
| No. 1 | —— | D10 to D13 |
| No. 2 | —— | D20 to D23 |
| No. 3 | —— | D30 to D33 |
| No. 4 | —— | D40 to D43 |
| No. 5 | —— | D50 to D53 |
| No. 6 | —— | D60 to D63 |
| No. 7 | —— | D70 to D73 |

2) In the case of pattern 1

| Station No. | Device No. | |
|-------------|----------------|-----------------|
| | Bit device (M) | Word device (D) |
| | 32 points | 4 points |
| No. 0 | M1000 to M1031 | D0 to D3 |
| No. 1 | M1064 to M1095 | D10 to D13 |
| No. 2 | M1128 to M1159 | D20 to D23 |
| No. 3 | M1192 to M1223 | D30 to D33 |
| No. 4 | M1256 to M1287 | D40 to D43 |
| No. 5 | M1320 to M1351 | D50 to D53 |
| No. 6 | M1384 to M1415 | D60 to D63 |
| No. 7 | M1448 to M1479 | D70 to D73 |

3) In the case of pattern 2

| Station No. | Device No. | |
|-------------|-----------------|-----------------|
| | Bit device (M) | Word device (D) |
| | 0 point | 8 points |
| No. 0 | M1000 to M1063 | D0 to D7 |
| No. 1 | M1064 to M11127 | D10 to D17 |
| No. 2 | M1128 to M1191 | D20 to D27 |
| No. 3 | M1192 to M1255 | D30 to D37 |
| No. 4 | M1256 to M1319 | D40 to D47 |
| No. 5 | M1320 to M1383 | D50 to D57 |
| No. 6 | M1384 to M1447 | D60 to D67 |
| No. 7 | M1448 to M1511 | D70 to D77 |

7.3.4 Setting retry count (D8178)

Set a value 0 to 10 to the special data register D8178. (Default = 3)

This setting is not required for the slave station.

If master station try to communicate the slave station this retry count or over, communication error occur in the station.

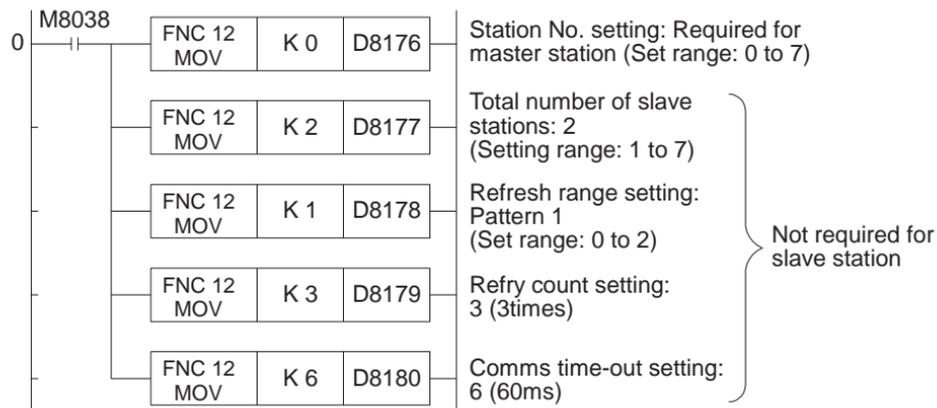
7.3.5 Setting comms time-out (D8179)

Set value 5 to 255 to the special data register D8179. (Default = 5)

This value multiply by 10 (ms) is time of comms time-out.

Comms time-out is time-out of communication time between the master station and slave station.

7.3.6 Program used for setting



Make sure to write the program above from the 0th step as the N:N network parameter setting program.

This program is not required to be executed because it becomes effective automatically when it is programmed in this position.

Note: Setting of the parameters for the N:N network is started at the 0th step (LD M8038), and finished when any instruction or device other than the program above is processed.

7.4 Error Code

When station occur communication error, special auxiliary relays (M8183 to M8191) of communication error is ON in the station And the error code put into special data registers (D8211 to 8218). This error code is following the table.

| Error code | Meaning | Error station | Check station | Description | Checking points |
|------------|-----------------------------------|---------------|---------------|--|---|
| 01H | Comms time-out error | L | M | After master station send request to slave station, no answer passing comms time-out. | Check wiring, power of programmable controller, RUN/STOP state (RUN is OK) |
| 02H | Station No. error | L | M | Station No. is not agreement between the master station and the slave station. | Check wiring |
| 03H | Comms counter error | L | M | Communication counter is not agreement between the master station and the slave station. | Check Wiring |
| 04H | Comms format error | L | M, L | Communication format is not right from slave station. | Check wiring, power of programmable controller, RUN/STOP state (RUN is OK), station No. setting |
| 11H | Comms time-out error | M | L | After slave station send answer to master station, master station do not send request to next slave station. | Check wiring, power of programmable controller, RUN/STOP state (RUN is OK) |
| 14H | Comms format error | M | L | Communication format is not right from master station. | Check wiring, power of programmable controller, RUN/STOP state (RUN is OK), station No. setting |
| 21H | No slave error | L | L *1 | The station No. is not in this network. | Check station No. setting. |
| 22H | Station No. error | L | L *1 | Station No. is not agreement between the master station and the slave station. | Check wiring |
| 23H | Comms counter error | L | L *1 | Communication counter is not agreement between the master station and the slave station. | Check wiring |
| 31H | Not receive comms parameter error | L | L *2 | When slave station receive request from master station before communication parameter. | Check wiring, power of programmable controller, RUN/STOP state (RUN is OK) |

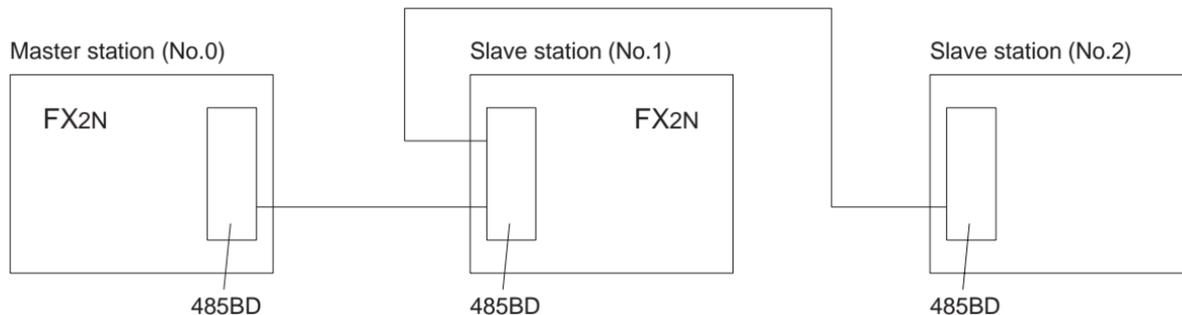
M : Master station L : Slave station

*1 Another slave station

*2 Self station

7.5 Examples Program

7.5.1 System Configuration



- 1) Refresh range: 32 bit devices and 4 word devices (Pattern 1)
- 2) Retry count : 3 times
- 3) comms time-out : 5 (50 ms)

7.5.2 Operations

The following operations are performed in the system configuration above.

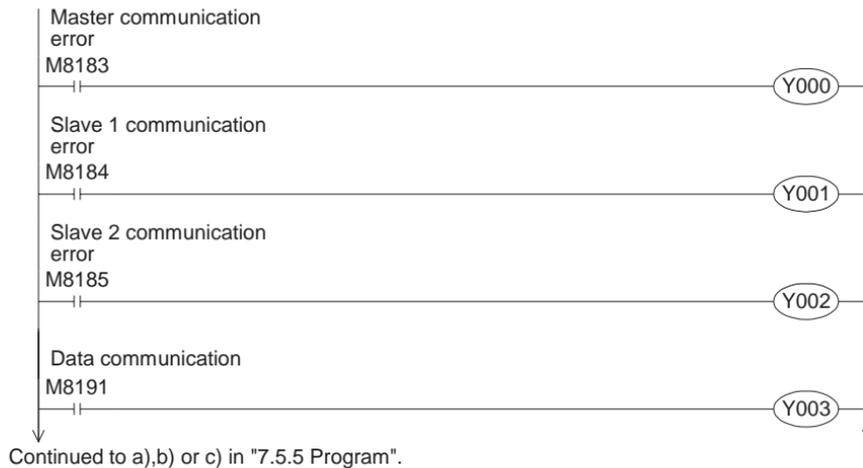
- ① The input points X000 to X003 (M1000 to M1003) in the master station are output to the output points Y010 to Y013 in the stations Nos. 1 and 2.
- ② The input points X000 to X003 (M1064 to M1067) in the station No. 1 are output to the output points Y014 to Y017 in the master station and the station No. 2.
- ③ The input points X000 to X003 (M1128 to M1131) in the station No. 2 are output to the output points Y020 to Y023 in the master station and the station No. 1.
- ④ The data register D1 in the master station is specified as the set value of the counter C1 in the station No. 1. The contact (M1070) status of the counter C1 is reflected on the output point Y005 in the master station.
- ⑤ The data register D2 in the master station is specified as the set value of the counter C2 in the station No. 2. The contact (M1140) status of the counter C2 is reflected on the output point Y006 in the master station.
- ⑥ The value of the data register D10 in the station No. 1 and the value of the data register D20 in the station No. 2 are added in the master station, and saved to the data register D3.
- ⑦ The value of the data register D0 in the master station and the value of the data register D20 in the station No. 2 are added in the station No. 1, and saved to the data register D11.
- ⑧ The value of the data register D0 in the master station and the value of the data register D10 in the station No. 1 are added in the station No. 2, and saved to the data register D21.

7.5.3 Example of Set Program

For the set program for the master station and the stations Nos. 1 and 2, refer to Section 7.3.6 program.

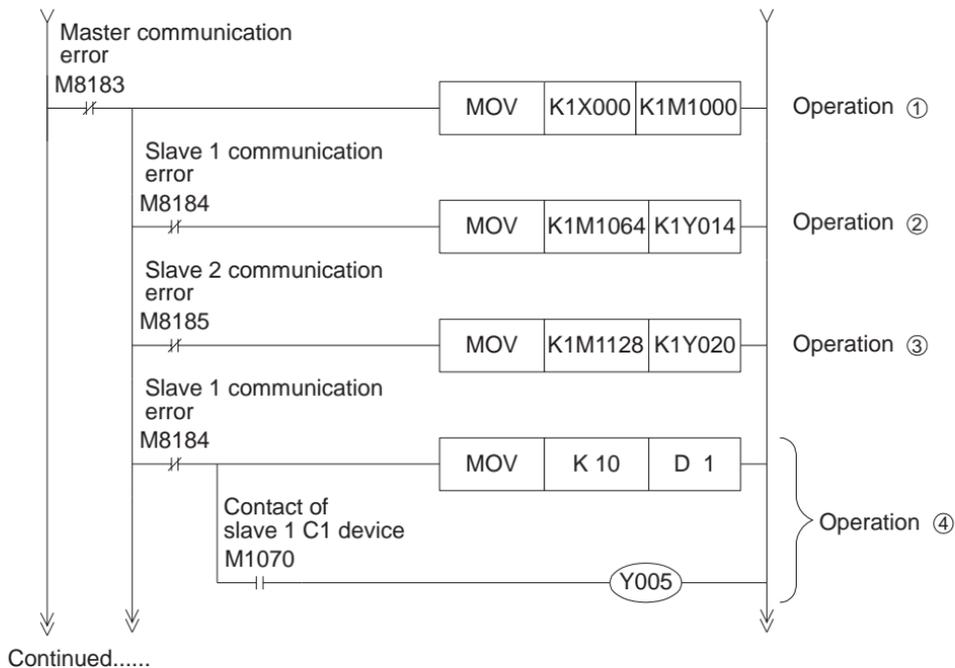
| | Master station | Slave station No. 1 | Slave station No. 2 | Remarks |
|-------|----------------|---------------------|---------------------|----------------------------------|
| D8176 | K0 | K1 | K2 | Station No. |
| D8177 | K2 | | | Total slave station : 2 stations |
| D8178 | K1 | | | Refresh range : Pattern 1 |
| D8179 | K3 | | | Retry count : 3 times (default) |
| D8180 | K5 | | | comms time-out : 50 ms (default) |

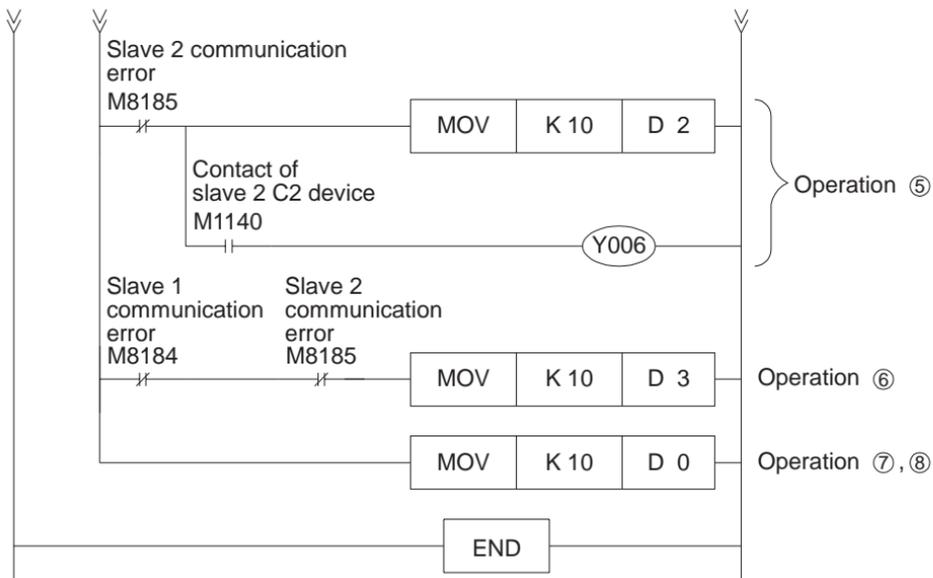
7.5.4 Example of Error Program



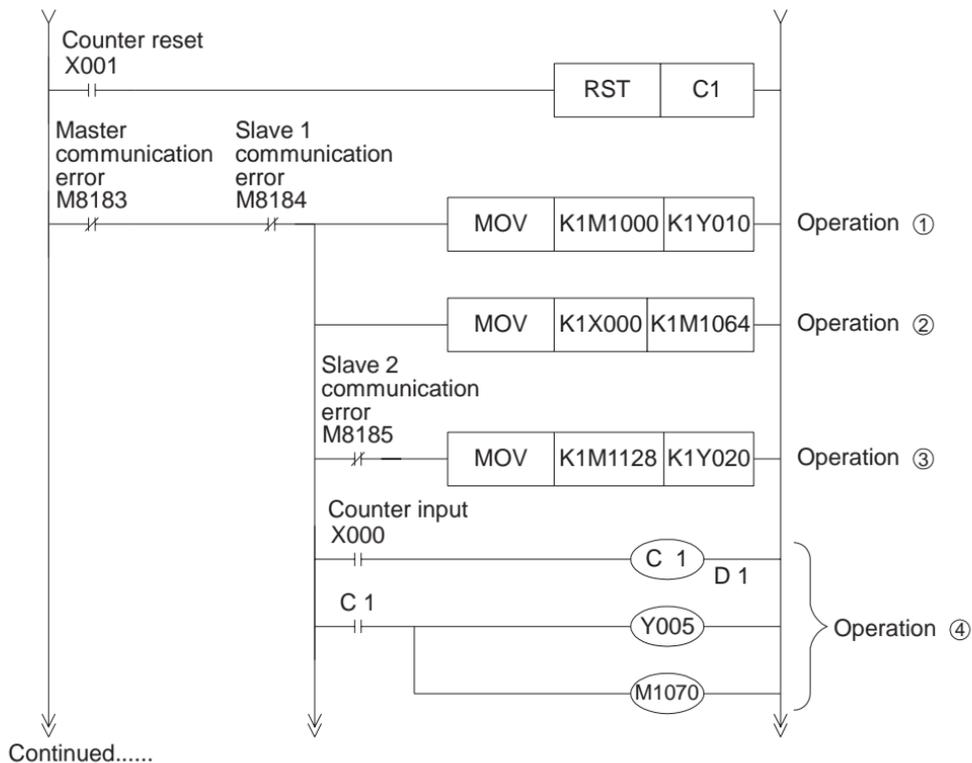
7.5.5 Example of Operation Program

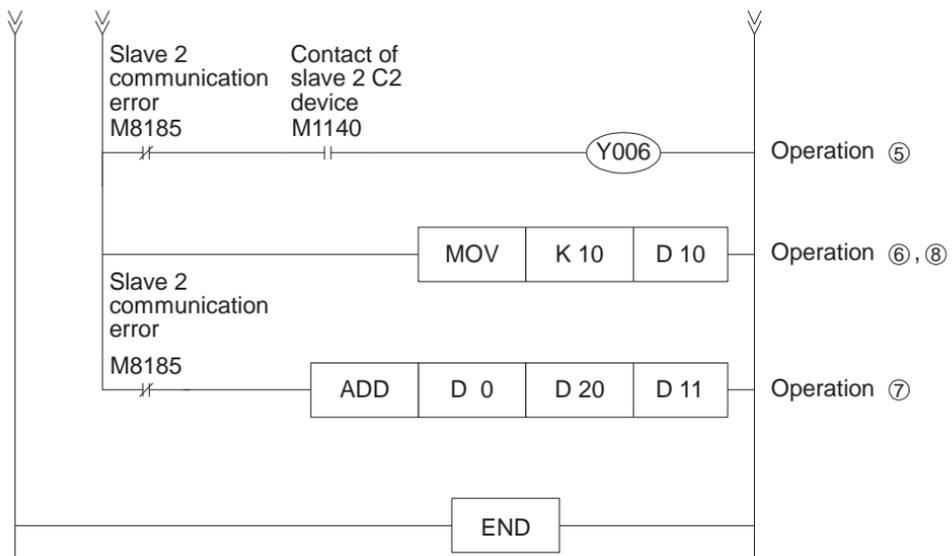
a) Program of master station



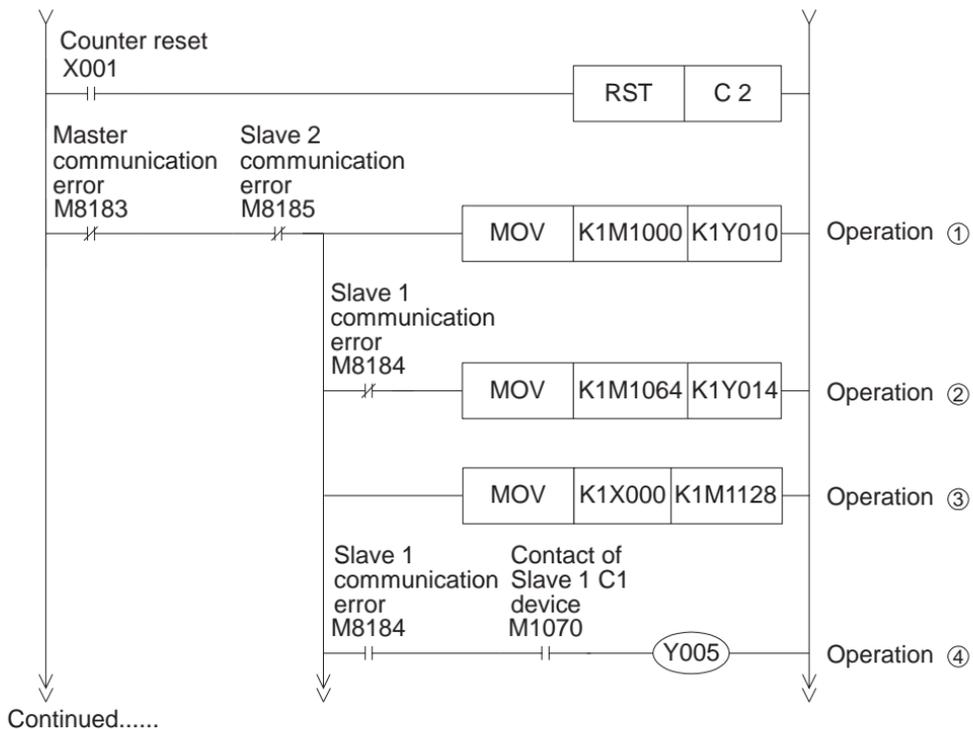


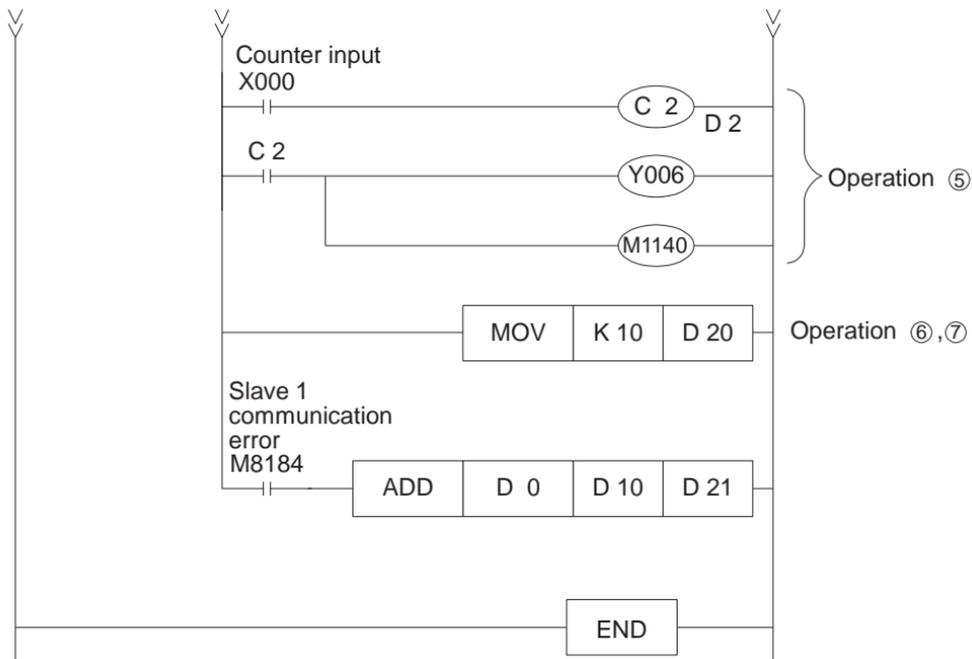
b) Program of slave station No.1





c) Program of slave station No.2





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8. DIAGNOSTICS

8.1 Common Items

- 1) Confirm the connection with the programmable controller by checking the status of the RD LED and SD LED provided on the 485BD.
 - When the these LEDs is lighted (ON), connection between the 485BD and the programmable controller is correct.
 - When the these LEDs is extinguished (OFF), connect the 485BD to the programmable controller using the procedure described in Chapter 2.
- 2) Check whether the VRRD or VRSC instruction is used in the program. If it is used, delete it, turn off the power of the programmable controller, then turn it on again.

8.2 Using the No Protocol

- 1) Check the status of the RD LED and the SD LED provided on each 485BD.
 - If the RD LED is not lighted when data is received, check the wiring.
 - If the SD LED is not lighted when data is sent, check the confirm the connection with the programmable controller
- 2) When setting for the N:N network (Section 7.3.5 program) is included in the program, delete the setting, turn off the power of the programmable controller, then turn it on again.
- 3) When the special auxiliary relay M8070 or M8071 is turned on, turn if off using a peripheral unit, turn off the power of the programmable controller, then turn it on again.
- 4) Make sure that the communication format is equivalent between an external unit (RS232C unit) and the programmable controller (D8120). If it is different, correct the setting of the communication parameters in the external unit or correct the contents of the D8120 in the programmable controller. When the D8120 is corrected, restart the RS instruction. When the communication parameters are corrected, turn off the power of the programmable controller and turn it on again.
- 5) Confirm the timing of data transmission. For example, before sending the data, make sure that the counterpart equipment is ready for receiving the data.
- 6) When a terminator is not used, make sure that the data quantity to be sent is consistent with the data quantity to be received. If they are not consistent each other, let them be consistent. (If the data quantity to be sent is changed, use a terminator.)
- 7) Make sure that external units are operating correctly.
- 8) Make sure that the send data format is equivalent to the receive data format. If they are different, let them be equivalent.
- 9) When two or more RS instructions are used in the program, make sure that only one RS instruction is executed in one operation cycle.
Make sure that the RS instruction does not become OFF (unexecuted status) while data is received or sent.

8.3 Using the Dedicated Protocol

- 1) Check the status of the RD LED and the SD LED provided on each 485 BD.
 - If both of them are lighted and extinguished, nothing is wrong.
 - If the RD LED is lighted/extinguished but the SD LED is not lighted/extinguished (not lighted at all), check the setting of the station No. and the transmission rate (baud rate).
 - If the RD LED is not lighted/extinguished, check the wiring and confirm the connection with the programmable controller.
- 2) When setting for the N:N network (Section 7.3.5 program) is included in the program, delete the setting, turn off the power of the programmable controller, then turn it on again.
- 3) Make sure that the communication format is equivalent between an external unit (RS232C unit) and the programmable controller (D8120). If it is different, correct the setting of the communication parameters in the external unit or correct the contents of the D8120 in the programmable controller. When the D8120 is corrected, turn off the power of the programmable controller and turn it on again.
- 4) Make sure that the communication target programmable controller station No. is equivalent to the station No. specified in the communication procedure. If they are different, let them be equivalent.
- 5) Make sure that the communication procedure is performed correctly. If it is not performed correctly, correct the setting in the computer.
- 6) Make sure that the communication procedure is performed correctly. If it is not performed correctly, correct the setting in the computer.
- 7) When the RS instruction is used in the program, delete it, turn off the power of the programmable controller, then turn it on again.
- 8) When the special auxiliary relay M8070 or M8071 is turned on, turn it off using a peripheral unit, turn off the power of the programmable controller, then turn it on again.

8.4 Using the Parallel Link

- 1) Check the status of the RD LED and the SD LED provided on each 485 BD.
 - If both of them are lighted and extinguished, nothing is wrong.
 - If the RD LED is lighted/extinguished but the SD LED is not lighted/extinguished (not lighted at all), check the setting of the master station and the slave stations.
 - If the RD LED is not lighted/extinguished, check the wiring.
- 2) When setting for the N:N network (Section 7.3.5 program) is included in the program, delete the setting, turn off the power of the programmable controller, then turn it on again.
- 3) When the special data register D8120 for the communication format or the parameters for the communication setting are used or when the value of the D8120 is not 0, perform the following.
 - When the D8120 is used in the program, delete it, turn off the power of the programmable controller, then turn it on again.
 - Check the value of the D8120 using a peripheral unit. If it is not 0, set it to 0 using the peripheral unit, turn off the power of the programmable controller, then turn it on again.
 - When the parameters for the communication setting are used, initialize them using a peripheral unit.
- 4) When the RS instruction is used in the program, delete it, turn off the power of the programmable controller, then turn it on again.
- 5) Make sure that the master station and the slave stations are set correctly. If the setting is incorrect, correct it.
- 6) Make sure that the devices for the master station and the slave stations are handled correctly. If they are handled incorrectly, correct the program so that they are handled correctly.

8.5 Using the N:N network

- 1) Check the status of the RD LED and the SD LED provided on each 485 BD.
 - If both of them are lighted and extinguished, nothing is wrong.
 - If the RD LED is lighted/extinguished but the SD LED is not lighted/extinguished (not lighted at all), check the setting of the station No., the transmission rate (baud rate) and the total number of slave stations.
 - If the RD LED is not lighted/extinguished, check the wiring.
- 2) When the special auxiliary relay M8070 or M8071 is turned on, turn it off using a peripheral unit, turn off the power of the programmable controller, then turn it on again.
- 3) When the RS instruction is used in the program, delete it, turn off the power of the programmable controller, then turn it on again.
- 4) When the special data register D8120 for the communication format or the parameters for the communication setting are used or when the value of the D8120 is not 0, perform the following.
 - When the D8120 is used in the program, delete it, turn off the power of the programmable controller, then turn it on again.
 - Check the value of the D8120 using a peripheral unit. If it is not 0, set it to 0 using the peripheral unit, turn off the power of the programmable controller, then turn it on again.
 - When the parameters for the communication setting are used, initialize them using a peripheral unit.
- 5) Make sure that the sequence error (special auxiliary relays M8183 to M8190) in each slave station is not turned on and that the special auxiliary relay M8191 is not turned off. If one of the M8183 to the M8190 is turned on or if the M8191 is turned off, check the error code of special data registers D8211 to D8218. Please see the following section 7.4.

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Under no circumstances will MITSUBISHI ELECTRIC be liable responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. MITSUBISHI ELECTRIC will accept no responsibility for actual use of the product based on these illustrative examples.

Owing to the very great variety in possible application of this equipment, you must satisfy yourself as to its suitability for your specific application.

USER'S MANUAL

FX₂N-485-BD COMMUNICATION BOARD



HEAD OFFICE: MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100 TELEX: J24532 CABLE MELCO TOKYO
HIMEJI WORKS: 840, CHIYODA CHO, HIMEJI, JAPAN

JY992D66201A
(MEE 9706)

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