MITSUBISHI

PROGRAMMABLE CONTROLLERS
MELSEC-F

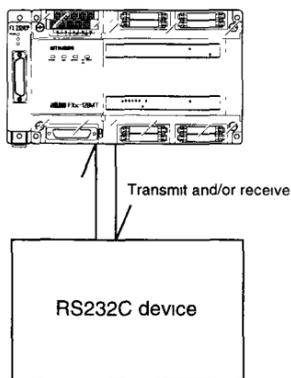ADVANCED AND EVER ADVANCING MITSUBISHI ELECTRIC

FX-232ADP COMMUNICATION ADAPTER
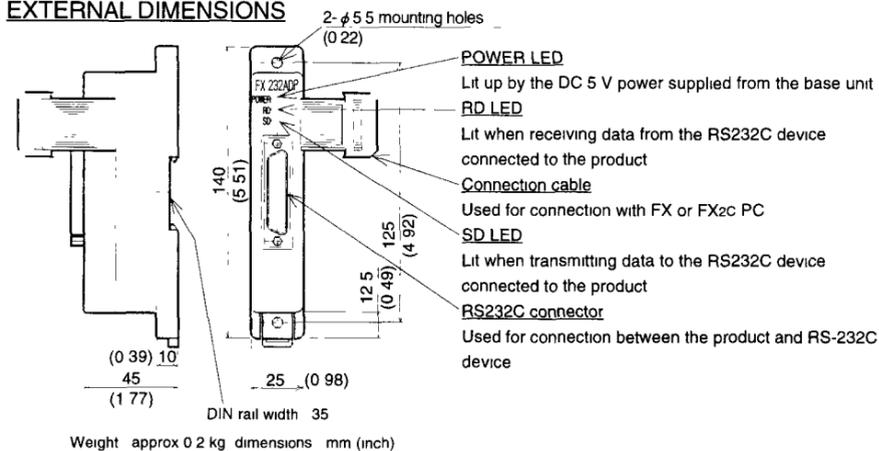## USER'S GUIDE

JY992D48801B

This manual contains text, diagrams and explanations which will guide the reader in the correct installation and operation of the FX-232ADP and should be read and understood before attempting to install or use the unit
Further information can be found in the FX SERIES PROGRAMMING MANUAL and FX SERIES HARDWARE MANUAL

1 INTRODUCTION

● The FX-232ADP type RS232C adapter (hereinafter called 232ADP) is connected to the FX(V3 07 or later), FX2c series PC to exchange serial data with a personal computer, barcode reader, printer, and other various RS232C devices

● Only one 232ADP unit can be connected to one base unit to the serial port provided at the left side

● The buffer size and location are specified by an RS instruction in the PC

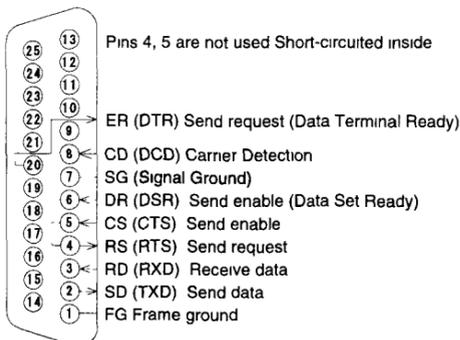● This product cannot be combined with special adapters such as FX-8AV, FX2-40AP/AW, or the like

Transmit and/or receive

RS232C device

EXTERNAL DIMENSIONS

2-φ5 5 mounting holes
(0 22)
140 (5 51)
125 (4 92)
125 (0 49)
(0 39) 10
45 (1 77)
25 (0 98)
DIN rail width 35

POWER LED
Lit up by the DC 5 V power supplied from the base unit
RD LED
Lit when receiving data from the RS232C device connected to the product
Connection cable
Used for connection with FX or FX2c PC
SD LED
Lit when transmitting data to the RS232C device connected to the product
RS232C connector
Used for connection between the product and RS-232C device

Weight approx 0 2 kg dimensions mm (inch)

2 TERMINAL LAYOUTS

The connector is a 25-pin D-SUB type, and the pin configuration is as shown below

Pins 4, 5 are not used Short-circuited inside

ER (DTR) Send request (Data Terminal Ready)
CD (DCD) Carrier Detection
SG (Signal Ground)
DR (DSR) Send enable (Data Set Ready)
CS (CTS) Send enable
RS (RTS) Send request
RD (RXD) Receive data
SD (TXD) Send data
FG Frame ground

Pin No.	Function
1	Frame ground
2	Send data (232ADP to RS232 device)
3	Receive data (RS232 device to 232ADP)
4 · 5	Not used
6	Shows RS232C device is ready to receive
7	Signal ground
8	ON when carrier is detected for data reception
2 0	Signal requesting preparation for data sending to RS232C device.

3 INSTALLATION NOTES AND USAGE

Performance specification

Transmission standard	Conforming to RS232C, 25pin D-SUB, connector used
Isolation method	Photo coupler isolation
Transmission distance	15m or less (shielded cable recommended)
Current consumption	DC 5V 200mA from base unit
Related flag and data registers	M8121:Send wait flag / D8120:Communication format
	M8122:Send flag / D8122:Remainder of send data
	M8123:Receive completion / D8123:Number of received data
	M8124:Carrier detection / D8124:Header byte
	M8161:8 bits/16 bits changeover / D8125:Terminator byte

General specification

General specifications (excluding following)	Same as those for the FX or FX2C base unit	
Dielectric withstand voltage	500V AC,1min	Between 25-pin D-SUB and base unit
Insulation resistance	500V DC,1MΩ by Megger	

● For data transmission to be effective it is necessary to match the communication format between the product and the RS232C device, such as baud rate and parity

Communication format D8120 (bit mapping)

Bit	Description	0(OFF)	1(ON)
b 0	Data length	7bit	8bit
b 1	Parity	(0 0) : None	
b 2		(0 1) : Odd	
		(1 1) : Even	
b 3	Stop	1bit	2bit
b 4		(0011) :	300
b 5		(0100) :	600
b 6	Baud rate (bps)	(0101) :	1,200
b 7		(0110) :	2,400
		(0111) :	4,800
		(1000) :	9,600
		(1001) :	19,200

Bit	Description	0(OFF)	1(ON)
b 8	Header	None	D8124 ※1
b 9	Terminator	None	D8125 ※2
b10	Not used	———	———
b11	Mode (Control line)	Ordinary mode	Single line mode
b12	Control line	None	H/W
b13	Not used	———	———
b14			
b15			

※1 The default value is STX (02H changeable)
※2 The default value is ETX (03H· changeable)

● 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.
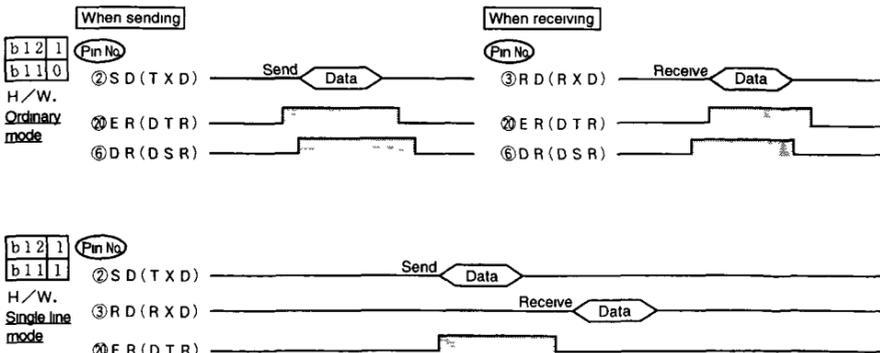
● An example of setting D8120 is shown below

```
    M8002
  ——||—— [MOV H138F D8120]
Setting input
                            b0
H138F= 0001  0011  1000  1111(binary)
The settings for the above program are as right
```

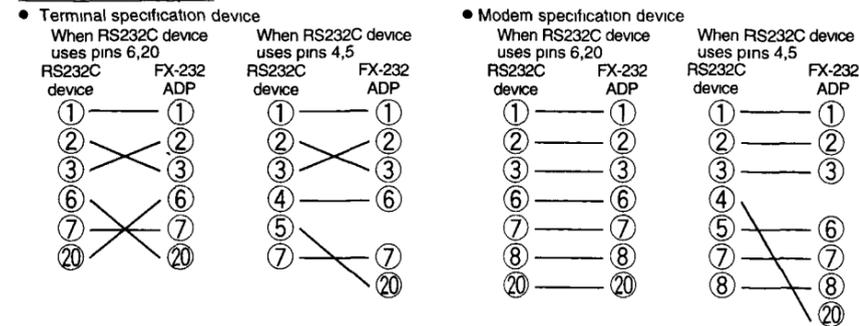| Data length	8 bit
Parity	Even
Stop	2 bit
Baud rate	9,600
Header	Used
Terminator	Used
Control line	H/W
Mode	Ordinary mode

● The control line is set by b12
b12=0 : No hardware hand shaking Send and receive are controlled by software protocol.
b12=1 : Hardware hand shaking Signal lines ER(DTR) and DR(DSR) are used to control send and receive of data

When sending
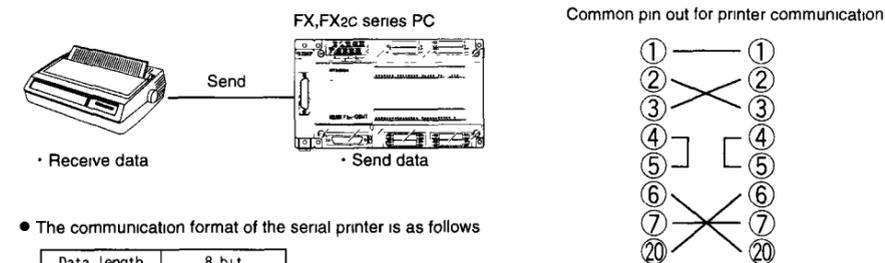b12 1
b11 0
H/W. Ordinary mode
②SD(TXD) — Send / Data
⑳ER(DTR)
⑥DR(DSR)

When receiving
b12 1
b11 0
H/W. Ordinary mode
③RD(RXD) — Receive / Data
⑳ER(DTR)
⑥DR(DSR)

When sending
b12 1
b11 1
H/W. Single line mode
②SD(TXD) — Send / Data
③RD(RXD) — Receive / Data
⑳ER(DTR)

4 WIRING

● The connections of RS232C devices varies with each device being used
Check the specification of the device, and connect

Connection examples

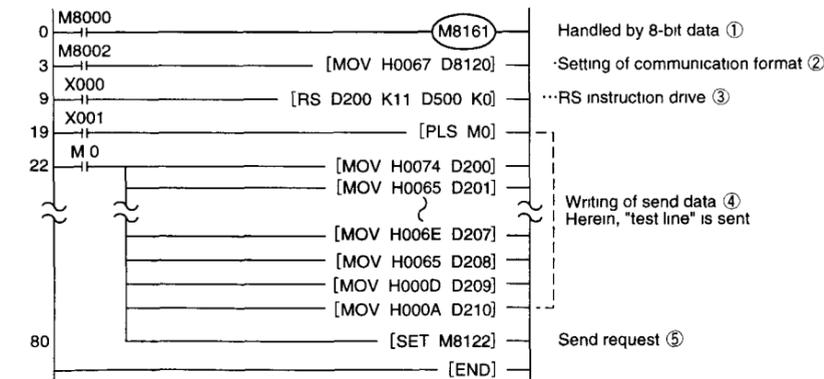● Terminal specification device

When RS232C device uses pins 6,20
RS232C device	FX-232 ADP
①	①
②	②
③	③
⑥	⑥
⑦	⑦
⑳	⑳

When RS232C device uses pins 4,5
RS232C device	FX-232 ADP
①	①
②	②
③	③
④	⑥
⑤	
⑦	⑦
	⑳

● Modem specification device

When RS232C device uses pins 6,20
RS232C device	FX-232 ADP
①	①
②	②
③	③
⑥	⑥
⑦	⑦
⑧	⑧
⑳	⑳

When RS232C device uses pins 4,5
RS232C device	FX-232 ADP
①	①
②	②
③	③
④	⑥
⑤	⑦
⑦	⑧
⑧	⑳

5 PROGRAM EXAMPLES

● Connecting 232ADP and a printer, and printing out the data sent from the PC

FX,FX2c series PC

Send

· Receive data   · Send data

Common pin out for printer communication
①	①
②	②
③	③
④	④
⑤	⑤
⑥	⑥
⑦	⑦
⑳	⑳

● The communication format of the serial printer is as follows

Data length	8 bit
Parity	Even
Stop bit	1 bit
Baud rate	2400bps

Sequence program

```
     M8000
0  ——||——————————————————————————(M8161)    Handled by 8-bit data ①
     M8002
3  ——||—————————————————[MOV H0067 D8120]   Setting of communication format ②
     X000
9  ——||———————————————[RS D200 K11 D500 K0]  RS instruction drive ③
     X001
19 ——||————————————————————————[PLS M0]
     M 0
22 ——||——————————————————[MOV H0074 D200]
                           [MOV H0065 D201]   Writing of send data ④
                           [MOV H006E D207]   Herein, "test line" is sent
                           [MOV H0065 D208]
                           [MOV H000D D209]
                           [MOV H000A D210]
80 ——————————————————————————[SET M8122]     Send request ⑤
                                    [END]
```

Operation

Power on → Turn on the power of the PC and printer, check the printer is on line and switch the PC to RUN. ①②

X000,ON → Turn on X000, and drive RS instruction ③

RS instruction drive

X001,ON → Every time X001 is turned on, the contents of D200 to D210 are sent to the printer, and "test line" is printed ④⑤

Data send

● In this example, CR (H000D) and LF (H000A) are written at the end of the message. The printer moves down one line for each message
CR Carriage Return
LF Line Feed

Note It may be necessary to set the DIP switches of your printer
Check your printer manual for how to configure the serial communications

- Connect 232ADP and a personal computer, and exchange data with the PC

Personal computer / FX,FX2C series PC

- Send
- Receive

Personal computer:
- Receive data
- Send data

FX,FX2C series PC:
- Send data
- Receive data

- Use the communication cable suited to the connector pin configuration of the personal computer
  (For representative wiring see section 4)

Preparation of software

- Use ordinary communication software (terminal emulator) or dedicated program in the personal computer
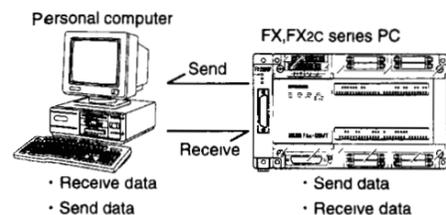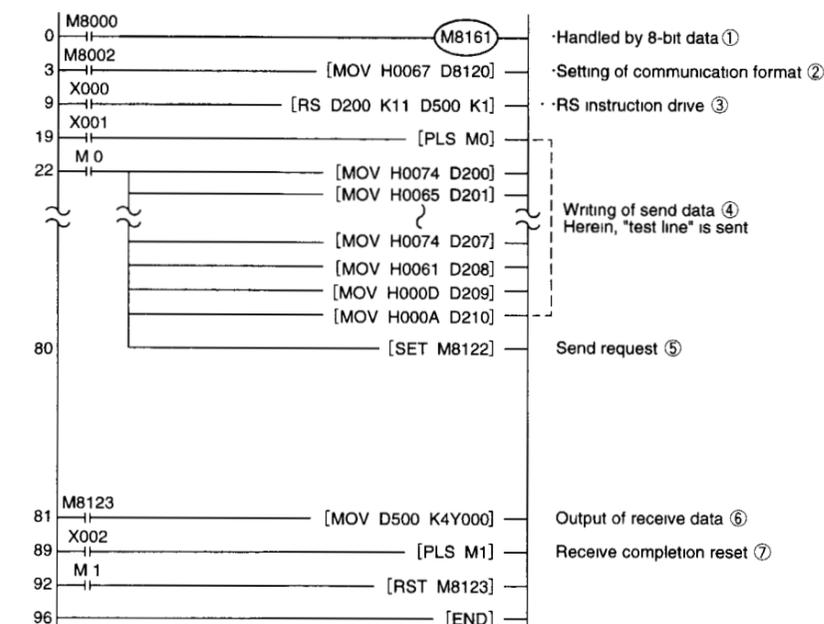
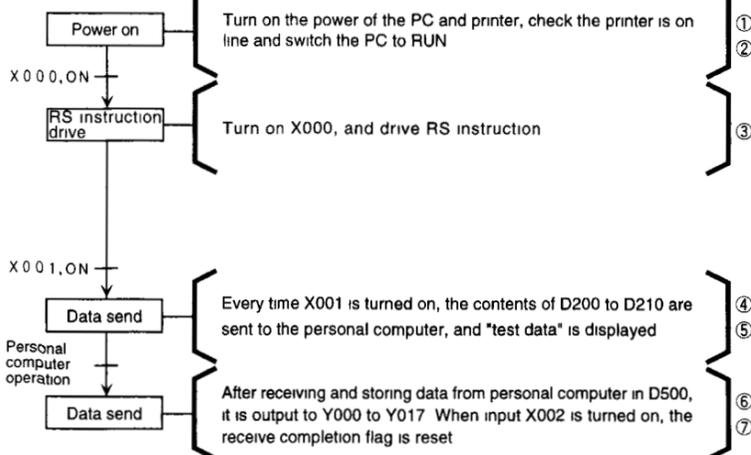The communication format of the PC for this example is as follows

Data length	8 bit
Parity	Even
Stop bit	1 bit
Baud rate	2400

If the communication format of the software cannot be adjusted to this setting, adjust the PC and the software to be the same

Sequence program

```
0   M8000
    ──┤├──────────────────────────(M8161)      ·Handled by 8-bit data ①
3   M8002
    ──┤├──────────────[MOV H0067 D8120]        ·Setting of communication format ②
9   X000
    ──┤├──────────────[RS D200 K11 D500 K1]    ·RS instruction drive ③
19  X001
    ──┤├──────────────────────────[PLS M0]
22  M0
    ──┤├──────────────[MOV H0074 D200]
                      [MOV H0065 D201]          Writing of send data ④
                                                Herein, "test line" is sent
                      [MOV H0074 D207]
                      [MOV H0061 D208]
                      [MOV H000D D209]
                      [MOV H000A D210]
80  ──────────────────────────────[SET M8122]  Send request ⑤
81  M8123
    ──┤├──────────────[MOV D500 K4Y000]         Output of receive data ⑥
89  X002
    ──┤├──────────────────────────[PLS M1]
92  M1
    ──┤├──────────────────────────[RST M8123]   Receive completion reset ⑦
96  ──────────────────────────────[END]
```

Operation

Power on	Turn on the power of the PC and printer, check the printer is on line and switch the PC to RUN	① ②
X000,ON / RS instruction drive	Turn on X000, and drive RS instruction	③
X001,ON / Data send	Every time X001 is turned on, the contents of D200 to D210 are sent to the personal computer, and "test data" is displayed	④ ⑤
Personal computer operation / Data send	After receiving and storing data from personal computer in D500, it is output to Y000 to Y017. When input X002 is turned on, the receive completion flag is reset	⑥ ⑦

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6 DIAGNOSTICS

- If data transfer does not perform correctly when using the 232ADP, check the operation using the following programs
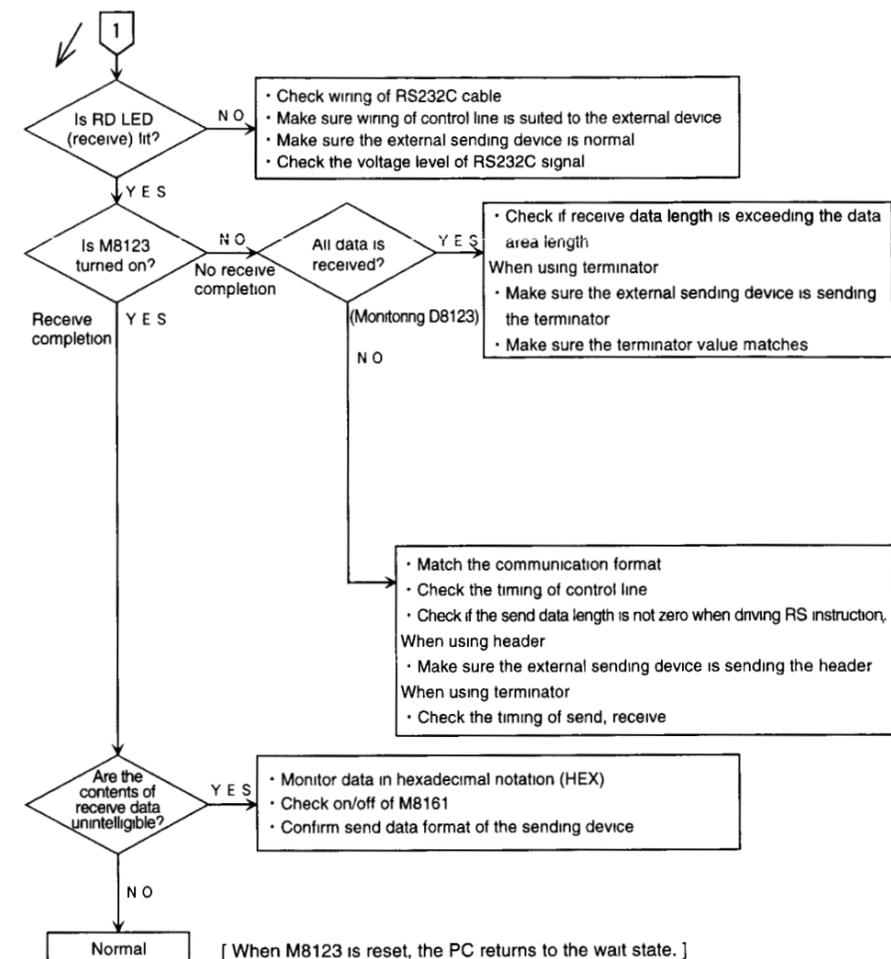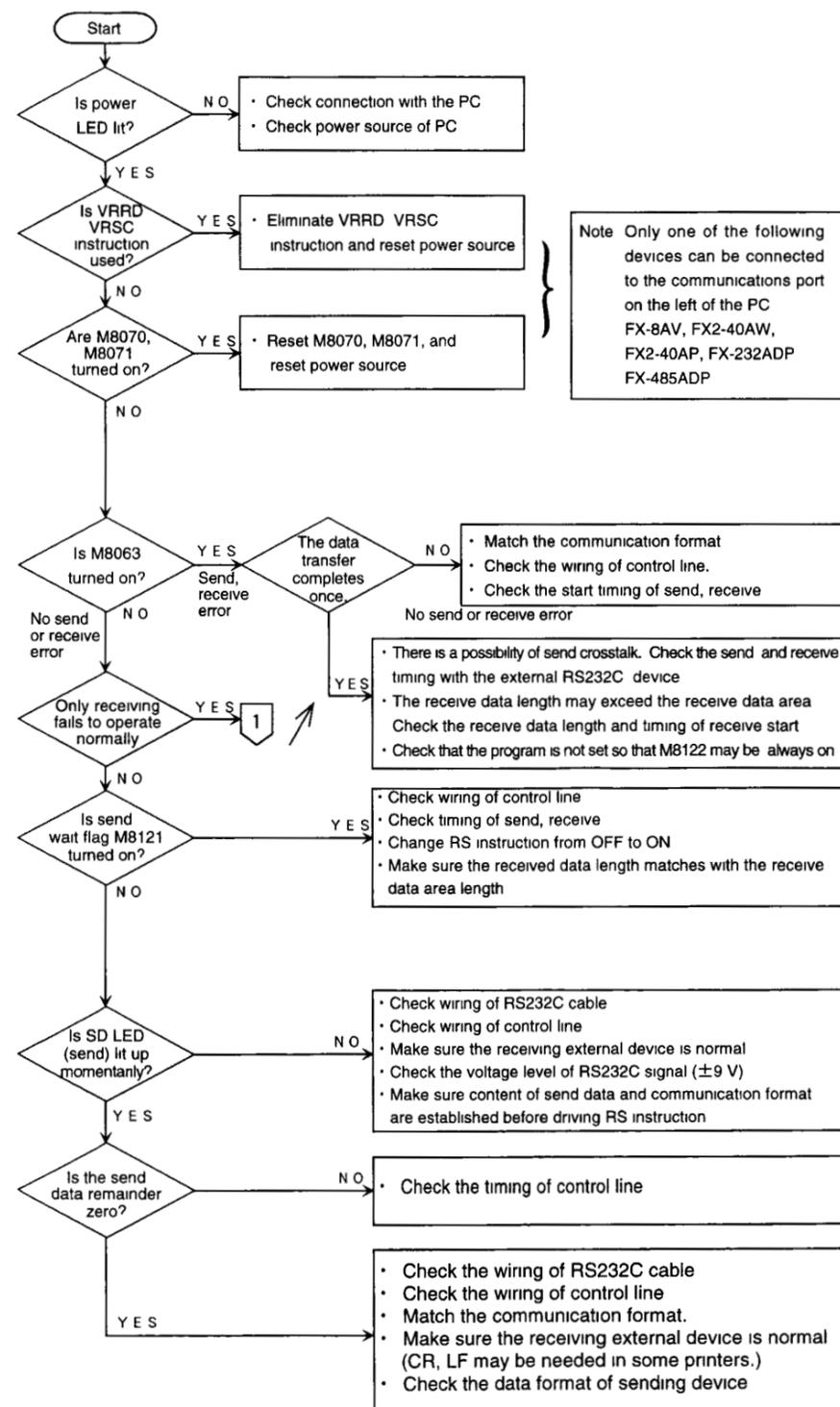
- Program when sending

```
M8002
──┤├────[MOV H**** D8120]
        ● Set the communication format according
          to the external device to be used
M8000
──┤├────[RS D0 K20 D100 K0]
M8013
──┤├────[PLS M0]
M0
──┤├────[SET M8122]
        Send request
        [END]
```

*Write the data to be sent to D 0 to D 1 9 before operating

- If sending and receiving using these programs is successful, it is considered that the operation failure was due to sequence program or communication protocol error

- Program when receiving

```
M8002
──┤├────[MOV H**** D8120]
        ● Set the communication format according
          to the external device to be used
        ● Header and terminator are not attached
M8000
──┤├────[RS D100 K0 D0 K20]
M8123
──┤├────[RST M8123]
        Receive completion reset
        [END]
```

- If not operating normally when using these programs, eliminate the cause using the flow diagrams shown following

Flow diagram

```
(Start)
  │
Is power LED lit? ──NO──→ · Check connection with the PC
  │ YES                    · Check power source of PC
  │
Is VRRD VRSC instruction used? ──YES──→ Eliminate VRRD VRSC instruction and reset power source
  │ NO
  │
Are M8070, M8071 turned on? ──YES──→ Reset M8070, M8071, and reset power source
  │ NO
```

Note Only one of the following devices can be connected to the communications port on the left of the PC
FX-8AV, FX2-40AW, FX2-40AP, FX-232ADP FX-485ADP

```
Is M8063 turned on? ──YES Send, receive error──→ The data transfer completes once ──NO──→ · Match the communication format
  │ NO                                                                                      · Check the wiring of control line.
  │ No send or receive error                                                                · Check the start timing of send, receive
  │
Only receiving fails to operate normally ──YES──→ 1 ↗
  │ NO
```

No send or receive error → YES → · There is a possibility of send crosstalk. Check the send and receive timing with the external RS232C device
· The receive data length may exceed the receive data area. Check the receive data length and timing of receive start
· Check that the program is not set so that M8122 may be always on

```
Is send wait flag M8121 turned on? ──YES──→ · Check wiring of control line
  │ NO                                        · Check timing of send, receive
                                              · Change RS instruction from OFF to ON
                                              · Make sure the received data length matches with the receive data area length
```

```
Is SD LED (send) lit up momentarily? ──NO──→ · Check wiring of RS232C cable
  │ YES                                        · Check wiring of control line
                                               · Make sure the receiving external device is normal
                                               · Check the voltage level of RS232C signal (±9 V)
                                               · Make sure content of send data and communication format are established before driving RS instruction
```

```
Is the send data remainder zero? ──NO──→ · Check the timing of control line
  │ YES
```

· Check the wiring of RS232C cable
· Check the wiring of control line
· Match the communication format.
· Make sure the receiving external device is normal (CR, LF may be needed in some printers.)
· Check the data format of sending device

```
  ↙ 1
Is RD LED (receive) lit? ──NO──→ · Check wiring of RS232C cable
  │ YES                           · Make sure wiring of control line is suited to the external device
  │                               · Make sure the external sending device is normal
  │                               · Check the voltage level of RS232C signal
```

```
Is M8123 turned on? ──NO No receive completion──→ All data is received? ──YES──→ · Check if receive data length is exceeding the data area length
  │ YES Receive completion    (Monitoring D8123)   │ NO
```

When using terminator
· Make sure the external sending device is sending the terminator
· Make sure the terminator value matches

· Match the communication format
· Check the timing of control line
· Check if the send data length is not zero when driving RS instruction,
When using header
· Make sure the external sending device is sending the header
When using terminator
· Check the timing of send, receive

```
Are the contents of receive data unintelligible? ──YES──→ · Monitor data in hexadecimal notation (HEX)
  │ NO                                                      · Check on/off of M8161
  │                                                         · Confirm send data format of the sending device
(Normal)
```

[When M8123 is reset, the PC returns to the wait state.]