

CC-Link

Remote Space Optical Transfer Unit

SOT-CP801/803 series

Compatible with CC-Link Ver. 1.10

Operation Manual

Read this manual before use.

Thoroughly read this manual and understand its contents before using, inspecting or servicing this unit.



Toyo Electric co. Ltd., Electronics Division

Head Office/ Kagiya Factory	Hikizawa 1-39, Kagiya-cho, Kasugai, Aichi 480-0393 Phone: 0568-88-1181 Fax: 0568-88-3086
Tokyo Sales Office	Furukawa Chiyoda Building No. 95, Uchikanda 2-15-9, Chiyoda-ku, Tokyo 101-0047 Phone: 03-3256-6665 Fax: 03-3254-3650
Nagoya Sales Office	Hanaguruma South Building No. 901, Meieki 5-16-17, Nakamura-ku, Nagoya 450-0002 Phone: 052-581-8508 Fax: 052-582-2020
Osaka Sales Office	Osaka Godo Building No. 801, Doyama-cho 1-5, Kita-ku, Osaka 530-0027 Phone: 06-6361-1626 Fax: 06-6312-6762
Hiroshima Sales Office	KN Building No. 201, Osu 3-7-2, Minami-ku, Hiroshima, Hiroshima 732-0802 Phone: 082-285-6194 Fax: 082-285-7286

DS42170.jtd 2001.01.28

Introduction

Thank you for choosing our SOT-CP801/803 series remote space optical transfer unit.

Fully understand the contents of this manual before starting the installation or maintenance work.

If you have any question or need further information regarding this manual, consult the nearest sales office or the Sales Engineering Section, Electronics Division, Kagiya Factory at 0568-88-1181.

Keep this manual with care.

Outline

These series provide remote space optical transfer units compatible with the Mitsubishi Electric's PLC `CC-Link Ver. 1.10' (hereinafter, referred to as C remote SOTs).

The C remote SOT is a remote I/O unit where a single station can be occupied by a system.

Up to 64 C remote SOTs can be connected with a single master unit.

It is a parallel optical transfer unit with 16 input bits and 16 output bits.

The SOT-CP801 series can communicate with the SOT-3102H3, SOT-NP801, SOT-V801 and SOT-V801R series.

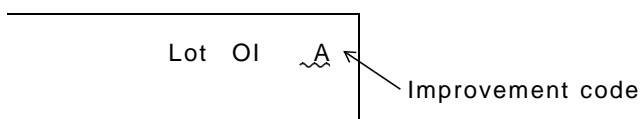
The SOT-CP803 series can communicate with the SOT-3302H3, SOT-NP803, SOT-V803 series.

The names of systems, product, companies, etc. shown in this manual are trademarks of relevant companies.

The models compatible with the CC-Link, Ver. 1.10 marked with the logo shown to the right.

CC-Link are

The CC-Link Ver.1.10 applies only to the specified optical transfer units. Make sure your unit has the improvement code "A" (or another alphabet) following the Lot.No. printed on the name plate on the back of the unit.



Contents

1. Precautionary Notes	4
2. Construction	5
2-1. Model	5
2-2. Example of wiring	5
2-3. Applicable master/local units	5
3. Component Names and Functions	6
4. Settings and Procedure	7
4-1. Procedure	7
4-2. Switch settings	8
4-3. Description of Modes	10
4-4. Installation	11
5. Electric Connection	12
5-1. Connection diagram	12
5-2. Caution in wiring	14
6. Programming Procedure	15
6-1. Outline of data exchange	15
6-2. Master station input/output signals	17
6-3. Master station buffer memory	18
6-4. Data processing time	23
6-5. Programming	24
7. Trouleshooting	27
7-1. In case a problem occurs	27
7-2. Troubleshooting	28
8. Maintenance and Inspection	32
9. Specifications	33
9-1. CC-Link specifications	33
9-2. Optical transfer specifications	33
10. Schematic	34
11. Gurantees	35
12. Revision History	35

1. Precautionary Notes

1-1. Power supply

Use a regulated voltage (24 VDC \pm 10%) power supply voltage that meets the specifications for this unit.

1-2. Resetting time

The unit does not function for about a minute after power-up as the internal resetting circuit is activated during this period.

1-3. Operation mode selection (in M/S mode)

The parallel optical transfer unit should be in the master mode when the other one is in the slave mode or vice versa. The unit has been factory-set to the master mode. To change the operation mode to slave, turn the mode select switch (SW1) at the top of the main body on.

1-4. Caution in installation

Use this unit indoor. Do not use it where:

- there may be dust, suspended particles or water or oil splashes that will damp optical signals,
- an evaporated solvent or corrosive gas exists,
- a light containing much infrared rays such as sunlight or incandescent light (disturbing light) directly enters the projector/receiver,
- the unit may be exposed to a temperature, humidity, vibration or impact that exceeds the rating,
- the SOT's optical passage may be interrupted by a person or another obstacle, or
- a device that will generate a strong magnetic field (e.g. electromagnetic contactor or motor) or a source of radio frequencies (e.g. inverter) is used.

1-5. Extention of the cable

The data link and power cables should be separately extended.

Power cable specifications

0.3 mm³ or more. The cable should be as short as possible and must not exceed 50 m. Install a regulated voltage power supply within 50 m. The extension should be adjusted in consideration of voltage drop.

Data link cable

Specified by the baud rate, etc. See section 5 `Electric Connection.'

Use a data link cable dedicated for CC-Link.

A shielded power cable is recommended.

1-6. The following instructions should be observed in routing the data link and power cables to protect them from noises and surges.

They should be separately wired and must not be laid near or bundled together with the main circuit or any line with a high voltage or load (should be at least 100 mm away from them).

The same applies to cable relays.

1-7. Communication settings

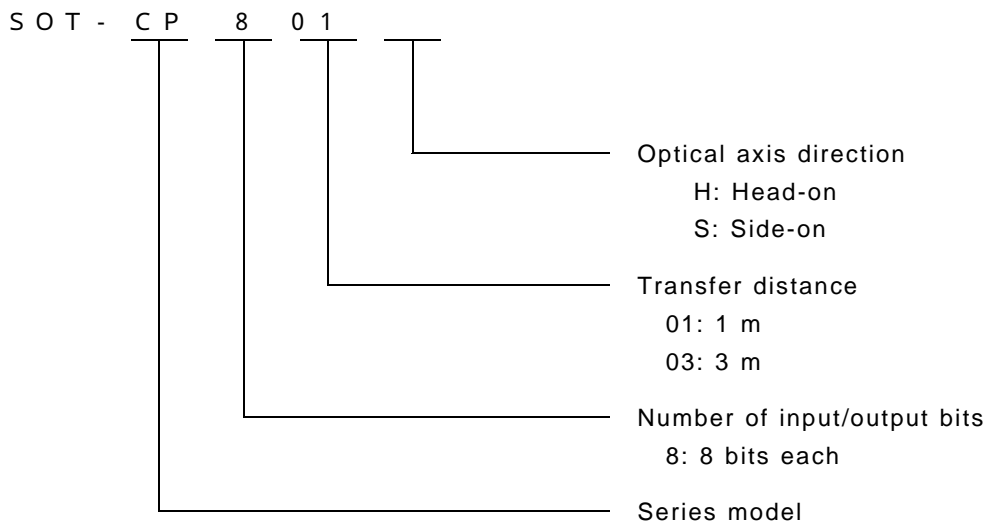
This unit requires several items to be set with switches, including the station No. and baud rate. See 4-2 `Switch settings.'

1-8. Terminal resistors

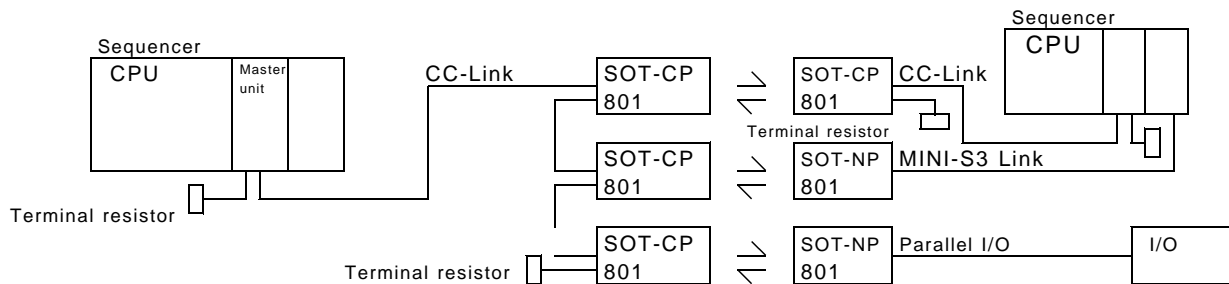
A terminal resistor provided with the master/slave unit should be installed at each end of the data link cable.

2. Construction

2-1. Model



2-2. Example of wiring

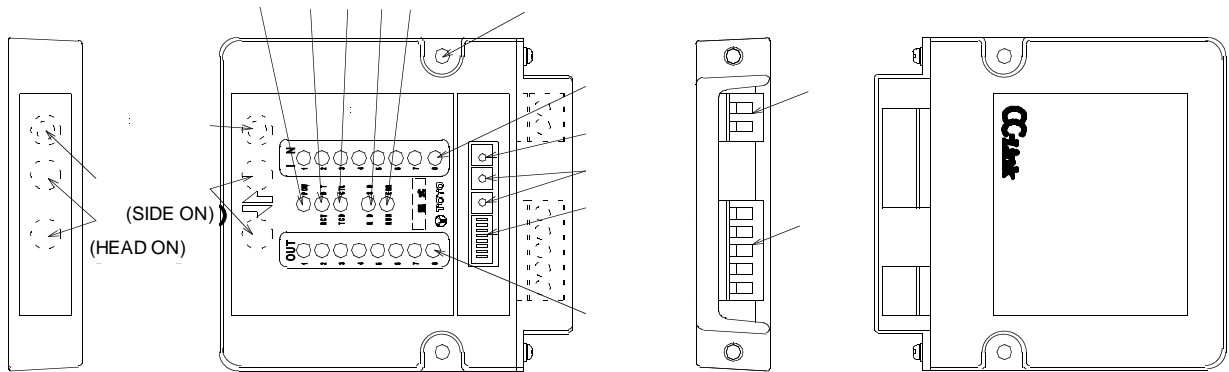


2-3. Applicable master/local units

The C remote SOT can be connected with the following master/local units.

- A1SJ61BT11: Master/local unit for AnS/A2US series
- AJ61BT11: Master/local unit for A series
- A1SJ61QBT11: Master/local unit for Q2AS series
- AJ61QBT11: Master/local unit for QnA series
- QJ61BT11: Master/local unit for Q series

3. Component Names and Functions



Station No. select switches (x2)

Used to select the remote station No. of the unit between 1 and 64.

Baud rate select switch

Used to select the baud rate of the CC-Link between 0 and 4.

Mode select switches

Used to select the M/S mode, X mode, etc.

POW (power lamp)

Lights (red) when the main body is normally supplied with power.

DT/RCV (normal data lamp/stabilized reception lamp)

DT lights (red) when data transfer between the other SOT is possible. RCV lights (green) when the reception level of your SOT is stabilized.

CTL/TCD (transfer stop input lamp/transmission stop input lamp)

CTL lights (red) when the optical transfer stops. TCD lights (green) when the optical transmission stops.

RUN/ERR (data link execution lamp/communication error lamp)

RUN lights (green) when data is normally exchanged with the master station. ERR lights (red) when a CC-Link communication error occurs and blinks when the position(s) of the station No. select switches or baud rate select switch is (are) changed with the power supply on.

SD/RD (data transmission lamp/data reception lamp)

SD lights (green) when data is being transmitted through the CC-Link. RD lights (red) when data is being received through the CC-Link.

IN (data input lamps)

Indicate bit by bit the status of the data transferred to the other transfer unit (RY).

OUT (data output lamps)

Indicate bit by bit the status of the data transferred from the other transfer unit (RX).

Projector/receiver

Units are offered in two types: head-on and side-on.

The head-on type has projector/receiver elements on the head.

The side-on type has projector/receiver elements beside the nameplate.

Light intensity control knob

Used to adjust the light intensity and, consequently, transfer distance when you do not want to send the light beyond the specified transmission distance.

Remove the cover and adjust the knob. (The cover is fixed with screws.)

Mounting holes

Holes used to fix the main body (2 holes, 5 mm dia.).

Power connector (MSTB 2.5/2-ST-5.08, Phoenix Contact)

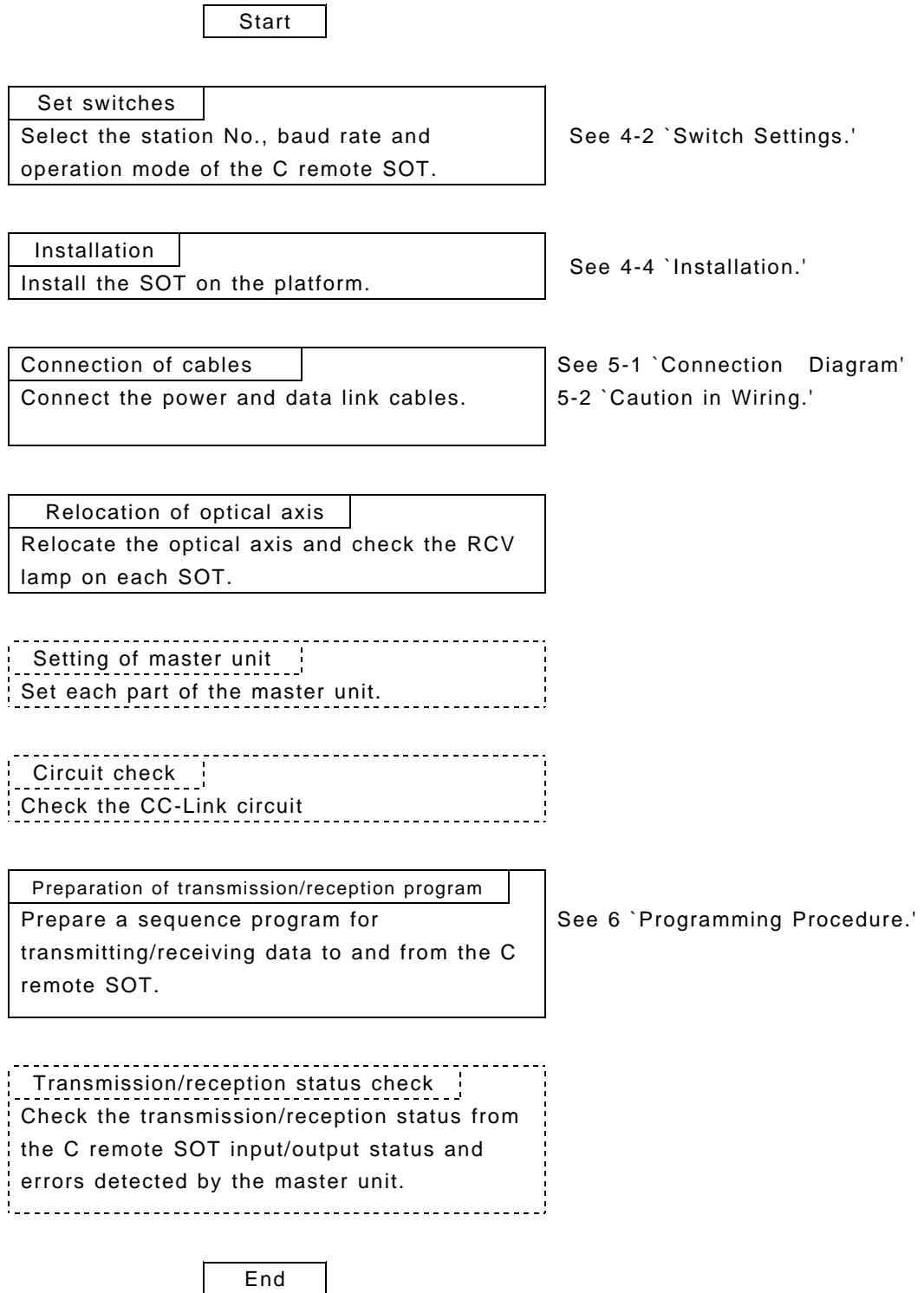
A connector terminal block for connecting the power supply.

Signal connector (MSTB 2.5/5-ST-5.08, Phoenix Contact)

A connector terminal block for transferring signals through the CC-Link.

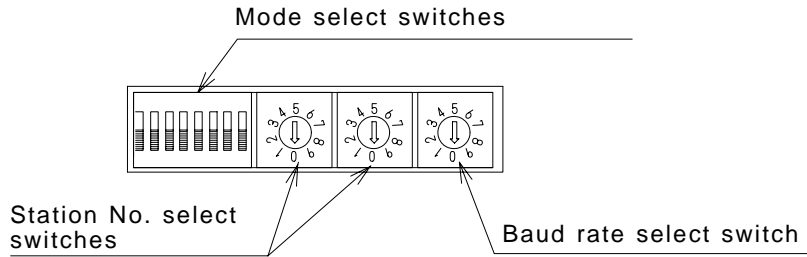
4. Settings and Procedure

4-1.Procedure



For the steps enclosed by dot lines, see the User's Manual for Master/Local Unit.

4-2.Switch settings



4-2-1.Setting the station No. select switches

Station No. select switches

	Description
	<p>X10 switch: Used to specify the first digit of the station No.</p> <p>X1 switch: Used to specify the second digit of the station No.</p> <p>Select a station No. between 01 and 64.</p>

The station No. should be `01' when there is no previous station or `previous station No. + number of stations occupied by the unit to which the previous station belongs.'
 (If the station No. of the previous station is `01' and the unit occupies two stations, for example, the station No. of your station should be `03.')

The switches have been factory-set to `00.'

Take care not to skip or duplicate any station No.

Precautionary instructions to be followed in making a connection with the CC-link are shown in the User's Manual for CC-Link Master/Local Unit.

4-2-2.Setting the baud rate select switch

Baud rate select switch

	No.	Description
	0	156 kbps
	1	625 kbps
	2	2.5 Mbps
	3	5 Mbps
	4	10 Mbps
	5-9	Setting error (cannot be used)

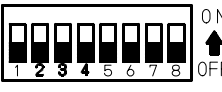
This setting must be consistent with that of the master station.
 If not, communication with the master station is impossible.

The switch has been factory-set to `0.'

Precautionary instructions to be followed in making a connection with the CC-link are shown in the User's Manual for CC-Link Master/Local Unit

4-2-3.Mode select switch

Description

		Description
		Raise the lever to turn on. SW1: M/S (master or slave) SW5: Normally off SW2: Mode (M/S or X) SW6: Normally off SW3: Normally off SW7: Normally off SW4: TRE SW8: Normally off

M/S select switch (SW1)

SW1	
OFF	Master (transmission preceded)
ON	Slave (reception preceded)

When data is communicated bi-directionally between two transfer units, the one should be designated as master and the other as slave.

The switch has been factory-set to `master.'

Mode select switch (SW2)

SW2	
OFF	M/S mode
ON	X mode

M/S mode: Standard bi-directional communication

X mode: Bi-directional/uni-directional communication

Description of each mode is given in 4-3 `Description of Operation Modes.'

The switch has been factory-set to `M/S mode.'

TRE switch (SW4)

SW4	
OFF	Output cleared in case of count-up
ON	Output retained in case of count-up

Count-up: Elapse of a given time after the completion of refresh data reception through the CC-Link and before the completion of next refresh data reception.

This time is determined by the baud rate (fixed).

Count-up time by the baud rate

Baud rate	Count-up time (ms)
10M	104.8
5M	104.8
2.5M	209.7
625K	833.8
156K	1677.6

The switch has been factory-set to `retain the output in case of count-up.'

4-2-4.After setting the switches

Attach the nameplate provided to prevent changes to the switch settings.

(The rear of the nameplate is adhesive. Remove a plastic sheet from the rear and attach.)

4-3.Description of Modes

4-3-1.M/S mode

Set the mode select switch (SW2) to OFF to select the M/S mode.

Designate your unit as master or slave.

When data is communicated bi-directionally between two transfer units, the one should be designated as master and the other as slave. Set the M/S select switch (SW1) to ON to designate your unit as slave.

Turn the power supply on. The power lamp (POW) lights.

When the other transfer unit is out of the operational range (not synchronized), the master repeats transmission and reception at regular intervals. The slave waits a signal transmitted from the master.

When the other transfer unit is within the operational range (synchronized):

- a. A signal is transmitted from the master to the slave.
- b. The slave detects the end of the signal transmitted from the master and transmits a signal in response to it.
- c. After transmitting a signal, the master receives the signal transmitted from the slave, detects the end of that signal, and transmits another signal. The master and slave detect the end of each signal transmitted from the other and alternately repeats the transmission and reception.

When the units are synchronized, the normal data lamp (DT) lights.

If the received data is determined normal, the relevant data output turns on.

If the reception level drops below 120% of the on-level of the DT output due to a stain on the projector/receiver or an optical axis shift, the stabilized reception lamp (RCV) and the RCV output turn off.

With the transfer stop input (CTL) on, the transfer stop lamp (CTL) lights and, as the transmission and reception are forcedly prohibited, the DT/RCV lamp and all data outputs turn off.

With the select the M/S mode, the remove input `RY1F' on the C remote SOT is used for transfer stop input (CTL).

4-3-2.X mode

Select the X mode

Set the mode select switch (SW2) to ON to select the M/S mode.

In the X mode, the M/S select switch is ineffective.

Turn the power supply on. The power lamp (POW) lights.

Select the transmission stop function.

When data is communicated uni-directionally between two transfer units, the transmission stop input (TCD) should be used. With the TCD input on, the transmission stops and only the reception remains possible.

When the other transfer unit is out of the operational range (not synchronized), the transfer unit with the TCD input off repeats transmission and reception at regular intervals. The one with the TCD input on waits a signal transmitted from the other.

When the other transfer unit is within the operational range (synchronized):

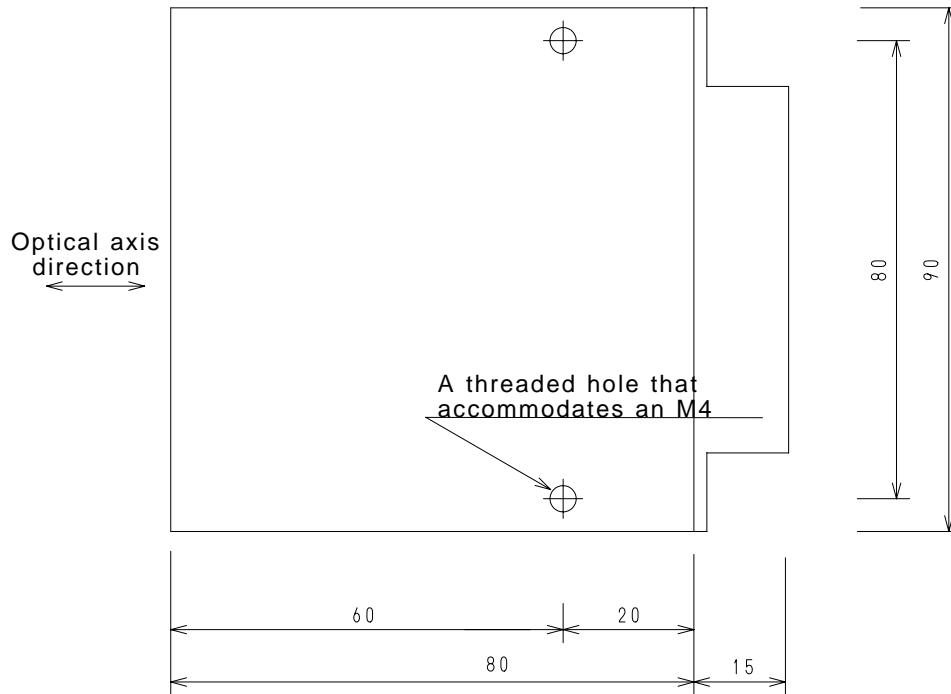
- a. The transfer unit with the TCD input off repeats transmission and reception at regular intervals.
- b. If the one with the TCD input on normally receives an optical signal from the other, it turns the DT and relevant data output on.
- c. If the TCD input turns off at this time, data can be bi-directionally communicated as in the M/S mode.]

With the select the X mode, the remove input `RY1F' on the C remote SOT is used for transmission stop input (TCD).

4-4. Installation

4-4-1. Drilling mounting holes

M4 screws are recommended for mounting.



Note 1: Tighten the C remote SOT mounting screws to a torque not higher than 8 kgf-cm.

4-4-2. Place for installation

Install the unit indoor.

To prevent malfunction and disorder, do not use it where:

there may be dust, suspended particles or water or oil splashes that will damp optical signals,

an evaporated solvent or corrosive gas exists,

Note: The main body is made of a resin and must not be cleaned with paint thinner or another solvent.

a light containing much infrared rays such as sunlight or incandescent light (disturbing light) directly enters the projector/receiver,

the unit may be exposed to a temperature, humidity, vibration or impact that exceeds the rating,

the SOT's optical passage may be interrupted by a person or another obstacle,

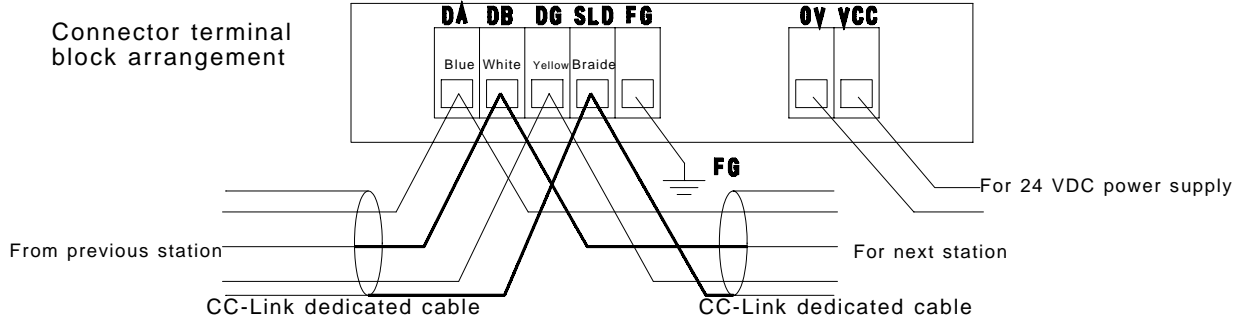
a reflecting surface may draw near the front of the receiver (to cause optional interference), or

a device that will generate a strong magnetic field (e.g. electromagnetic contactor or motor) or a source of radio frequencies (e.g. inverter) is used.

5. Electric Connection

5-1. Connection diagram

5-1-1. Connection of the C remote SOT



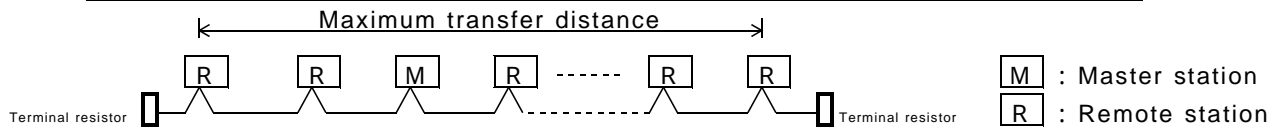
Each cable should be stripped to 7 mm.

5-1-2. Mutual connection of link data cables (for CC-Link, Ver. 1.10)

The station-to-station distance and total extension distance are determined by the baud rate setting and the construction of units used.

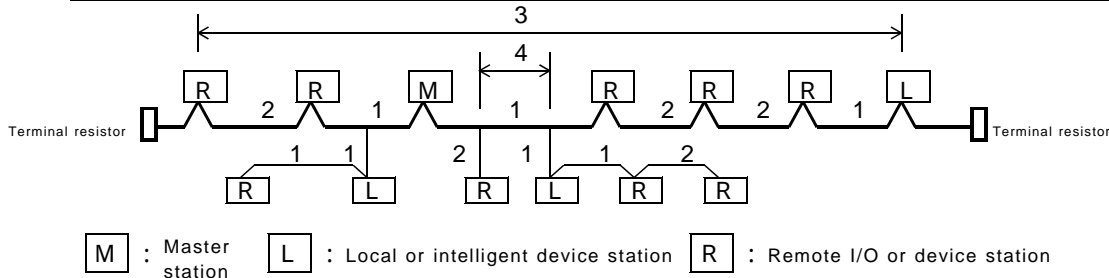
Maximum transfer distance

Baud rate	156kbps	625kbps	2.5Mbps	5Mbps	10Mbps
Station-to-station cable length	20 cm or more				
Maximum transfer distance	1200m	900m	400m	160m	100m



For T branch connection

Baud rate		156kbps	625kbps	2.5M/5M/10Mbps unacceptable
Station-to-station cable length	Between master/local station or intelligent device station and previous/subsequent station 1	1 m or more		For the system only consisting of remote I/O and remote device stations
	Between remote I/O station and remote device station 2	2 m or more		For the system including local and intelligent device stations
Maximum number of units connected per branch		6		
Maximum trunk length	3	500m	100m	Excluding cables between terminal resistors and branches
T branch interval	4	Not limited		
Maximum branch length		8m		Cable length per branch
Total branch length		200m	50m	Total length of branches
Terminal resistor		110	1/2W x 2	Connected between DA and DB at trunk ends
T branch terminal block/connector		Terminal block: A commercial one Connector: FA sensor connector		Trunk cables should be stripped to a shorter length.



Note: All units and cables on the system should be compatible with the CC-Link, Ver. 1.10.

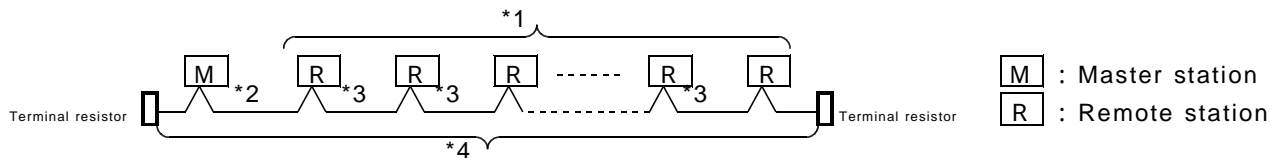
5-1-3. Mutual connection of link data cables (when units older than the CC-Link, Ver. 1.10 are used)

The station-to-station distance and total extension distance are determined by the baud rate setting and the construction of units used.

(The following table applies when FAN-SB and FANC-SBH are used.)

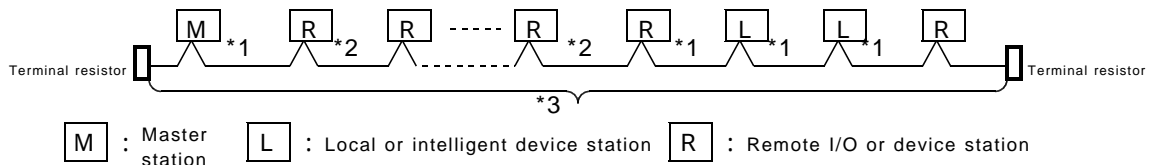
For the system only consisting of remote I/O and remote device stations

Baud rate	Total number of remote stations *1	Cable length at each end of master station *2	Minimum cable length between remote stations *3	Total cable extension*4	
				FANC-SB	FANC-SBH
156 Kbps	64 or less	1.0 m or more	0.3 m or more	1200 m or less	1200 m or less
625 Kbps				600 m or less	900 m or less
2.5 Mbps				200 m or less	400 m or less
5 Mbps				110 m or less	160 m or less
10 Mbps	48 or less	1.0 m or more	0.6 m or more	150 m or less	
			0.3 m or more	50 m or less	20 m or less
			0.4 m or more		30 m or less
			0.6 m or more	80 m or less	
			0.7 m or more		100 m or less
			1.0 m or more	100 m or less	
32 or less	32 or less	1.0 m or more	0.3 m or more	50 m or less	80 m or less
			0.4 m or more		100 m or less
			0.3 m or more		



For the system including local and intelligent device stations

Baud rate	Cable length at each end of master, local and intelligent device stations *1	Minimum cable length between remote I/O and remote device stations *2	Total cable extension *3	
			FANC-SB	FANC-SBH
156 Kbps	2.0 m or more	0.3 m or more	1200 m or less	1200 m or less
625 Kbps			600 m or less	600 m or less
2.5 Mbps			200 m or less	200 m or less
5 Mbps			110 m or less	110 m or less
10 Mbps	2.0 m or more	0.6 m or more	150 m or less	150 m or less
		0.3 m or more	50 m or less	
		0.6 m or more	80 m or less	
		0.7 m or more		50 m or less
		1.0 m or more	100 m or less	80 m or less



Install the terminal resistor provided with the master/local unit at each end of the data link cable. The terminal resistor type depends on the cable.

Install 110 for FANC-SB or FANC-SBZ or 130 for FANC-SBH.

Note: All units and cables on the system should be compatible with the CC-Link, Ver. 1.10.

For detail, see the User's Manual for CC-Link System Master/Local Unit.

5-1-4. Maximum number of units connected

The C remote SOT is a remote I/O station and occupies a single station. Up to 64 SOTs maybe connected.

When other units are to be connected, the following conditions should be met.

$$\{ (1 \times a) + (2 \times b) + (3 \times c) + (4 \times d) \} \leq 64$$

a: Number of units that occupy a single station each

b: Number of units that occupy two stations each

c: Number of units that occupy three stations each

d: Number of units that occupy four stations each

$$\{ (16 \times A) + (54 \times B) + (88 \times C) \} \leq 2304$$

A: Number of remote I/O stations

B: Number of remote device stations

C: Number of local, standby master and intelligent device stations

5-2. Caution in wiring

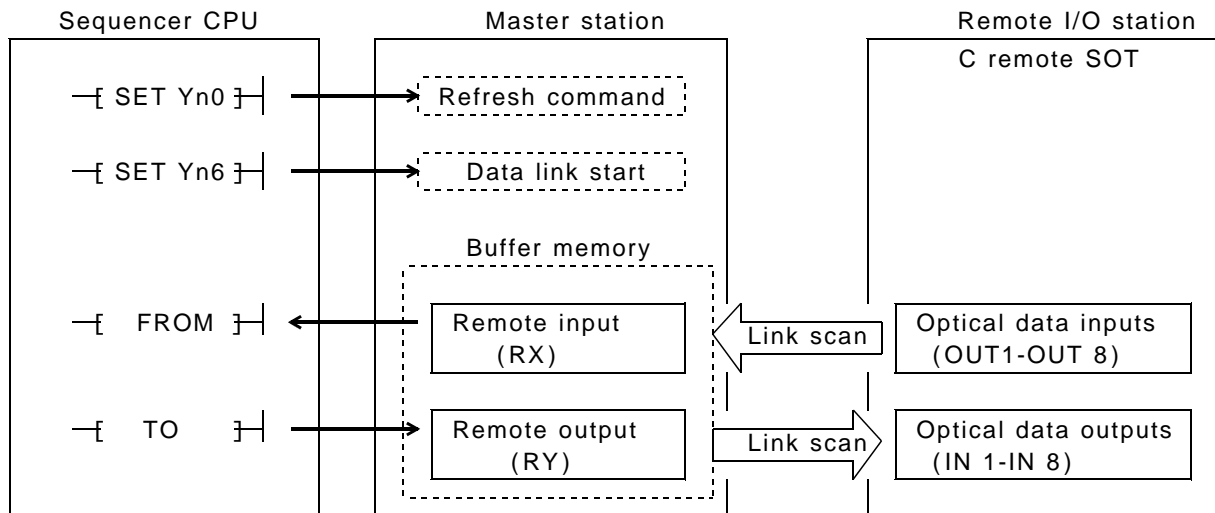
- (1) The data link cable should be connected with a CC-Link dedicated cable.
Use the same type of data link cables for the same link. Do not use various types of data link cables for the same link.
- (2) The shielded (braided) cable to be connected to the connector terminal block should be stripped to as small a length as possible.
- (3) Install the terminal resistor provided with the master/local unit at each end of the data link cable.
- (4) Using a noise filter, EMI filter and/or ferrite core with the power cable may be effective to suppress the noise at the power supply.
- (5) Power cable extension
The power cable extension should be as short as possible and must not exceed 50 m. Use a cable with 0.3 mm² or thicker conductor.
(Install a regulated voltage power supply within 50 m. The extension should be adjusted in consideration of voltage drop. A shielded power cable is recommended.
- (6) The following instructions should be observed in routing the data link cables to protect them from noises and surges.
The data link and power cables must not be laid near or bundled together with the main circuit or any line with a high voltage or load (should be at least 100 mm away from them).
The data link and power cables to the C remote SOT should also be separated.
- (7) No conductor should protrude from the cables connected to the connector terminal block. Braided wires should be insulated using tubes or such to prevent the contact with other wires.
- (8) Cables should be secured so that conductors will not be cut due to vibration.
- (9) The braid (shielding) of the data link cable should be grounded at both ends of the cable in accordance with Class D (Class 3) regulations.
- (10) All units and cables on the system should be compatible with the CC-Link, Ver. 1.10.

6. Programming Procedure

6-1. Outline of data exchange

6-1-1 Data exchange flow

The data exchange flow between the C remote SOT and the master station is outlined below.



The refresh command (Yn0) turns on.

The request for data link start (Yn6 or Yn8) turns on.

The link is scanned to store the optical data inputs (OUT) from the C remote SOT in the remote input (RX) area of the master station.

Data is uploaded from the remote input (RX) area of the master station according to the FROM command.

Data is downloaded from the remote output (RY) area of the master station according to the TO command.

The link is scanned to send data in the remote output (RY) area of the master station to the optical data outputs (IN) of the C remote SOT.

6-1-2.Processing of remote input/output signals of the C remote SOT

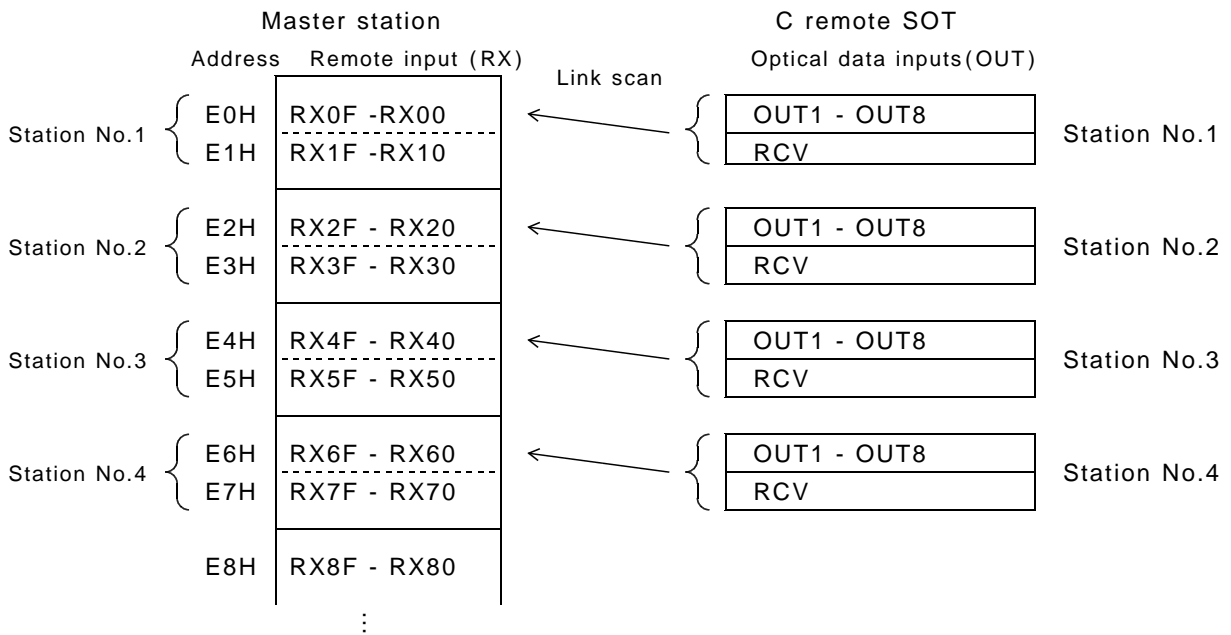
Remote input/output signals of the C remote SOT are processed via the remote input (RX) and remote output (RY) areas of the master station.

Remote inputs/outputs of the master station are assigned to addresses E0H to 15FH (RX)and 160H to 1DFH (RY) in the buffer memory.

For detail of the buffer memory, see 6-3 `Buffer memory of master station.'

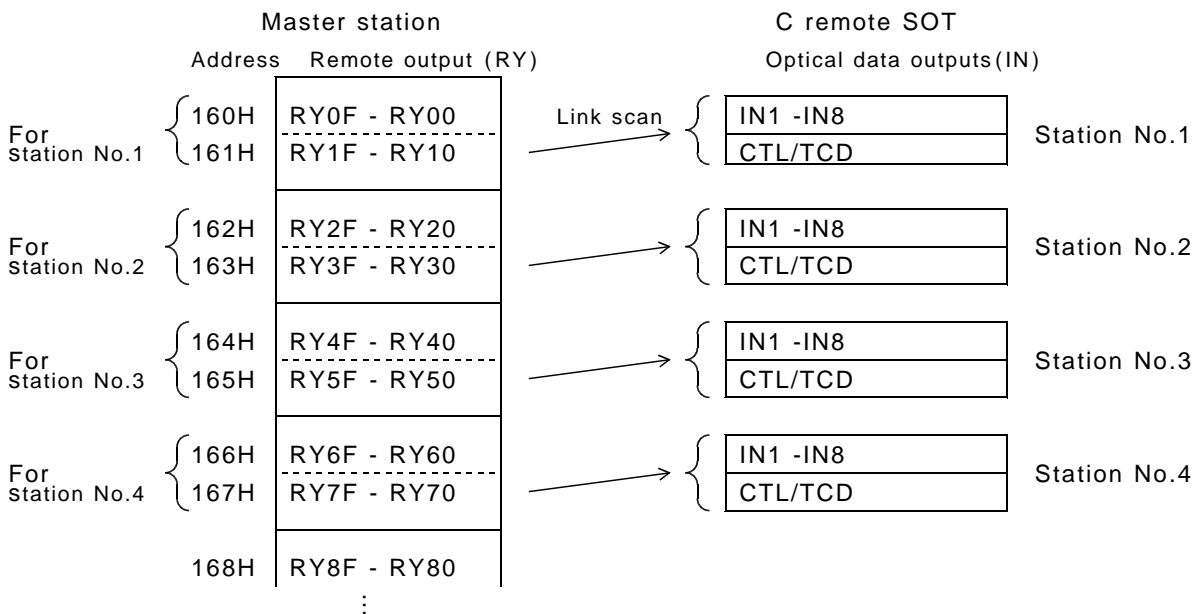
Remote input (RX) area

Optical data inputs of the C remote SOT are always stored in the remote input area of the master station through link scanning.



Remote output (RY) area

Data in the remote output area of the master station is always sent to optical data outputs of the C remote SOT through link scanning.



6-2.Master station input/output signals

The master station input/output signals to and from the CPU unit are listed below.

For detail of the input/output signals, see the User's Manual for CC-Link System Master/Local Unit.

'n' in the device No. column represents the starting I/O No. of the master station, which is determined by the number of units installed in front of the master station.

If the starting I/O No. of the master station is X/Y20, for example:

$$X(n+0)-X(n+1F) = X20-X3F$$

$$Y(n+0)-Y(n+1F) = Y20-Y3F$$

I/O Signal List

Device No.	Signal name	Device No.	Signal name
X n 0	Unit failure	Y n 0	Refresh command
X n 1	Your station data-linked	Y n 1	(Not used)
X n 2	Parameters set	Y n 2	
X n 3	Other station data-linked	Y n 3	
X n 4	Request for unit reset accepted	Y n 4	Request for unit reset
X n 5	(Not used)	Y n 5	(Not used)
X n 6	Data linking per buffer memory parameters normally started	Y n 6	Request for data linking per buffer memory parameters
X n 7	Data linking per buffer memory parameters abnormally started	Y n 7	(Not used)
X n 8	Data linking per E ² PROM parameters normally started	Y n 8	Request for data linking per E ² PROM parameters
X n 9	Data linking per E ² PROM parameters abnormally started	Y n 9	(Not used)
X n A	Parameters normally registered in E ² PROM	Y n A	Request for registration of parameters in E ² PROM
X n B	Parameters abnormally registered in E ² PROM	Y n B	(Not used)
X n C	(Not used)	Y n C	
X n D		Y n D	
X n E		Y n E	
X n F	Unit ready	Y (n + F)	
X (n + 1) 0	(Not used)	Y (n + 1) 0	
X (n + 1) 1		Y (n + 1) 1	
X (n + 1) 2		Y (n + 1) 2	
X (n + 1) 3		Y (n + 1) 3	
X (n + 1) 4		Y (n + 1) 4	
X (n + 1) 5		Y (n + 1) 5	
X (n + 1) 6		Y (n + 1) 6	
X (n + 1) 7		Y (n + 1) 7	
X (n + 1) 8		Y (n + 1) 8	
X (n + 1) 9		Y (n + 1) 9	
X (n + 1) A		Y (n + 1) A	
X (n + 1) B		Y (n + 1) B	
X (n + 1) C		Y (n + 1) C	
X (n + 1) D		Y (n + 1) D	
X (n + 1) E		Y (n + 1) E	
X (n + 1) F		Y (n + 1) F	

6-3.Master station buffer memory

6-3-1.Master station buffer memory

The master station buffer memory is used for data exchange between a remote unit and the CPU unit.

Assignment of buffer memory addresses is shown below.

For detail of the buffer memory, see the User's Manual for CC-Link System Master/Local Unit.

Master Station Buffer Memory Addresses

Address (hexadecimal)	Item	Description	Read/write 3
0H - 5FH	Parameter information area	Stores the information (parameters) required for data linking.	Read/write enabled
60H - DFH	(Not used) 1	_____	_____
E0H -15FH	Remote input (RX)	Stores the status of inputs from remote/local stations.	Read only
160H -1DFH	Remote output (RY)	Stores the status of outputs to remote/local stations.	Write only
1E0H -2DFH	Remote register (RWw)	Stores the data transmitted to remote/local stations.	Write only
2E0H -3DFH	Remote register (RWr)	Stores the data received from remote/local stations.	Read only
3E0H -5DFH	(Not used) 1	_____	_____
5E0H -5FFH	Link relay(SB)	Stores the data link status.	Read/write enabled 2
600H -7FFH	Link register(SW)	Stores the data link status.	
800H -9FFH	(Not used) 1	_____	_____
A00H -FFFH	Random access buffer	Used for dedicated instructions such as RIRD and RIWT.	Read/write enabled

1: Do not write any data in the areas not used. Doing so may lead to an error.

2: Writing is not enabled for some devices.

3: Do not write in the read-only areas from the sequencer CPU.

6-3-2. Setting the parameter information area

Specify the conditions for data linking in the parameter information area of the master station.

Number of stations connected (address 01H, defaulted 64)

Specify the number of remote/local stations connected with the master station (including reserved ones).

Specify a number between 1 and 64.

This is not the number of occupied stations.

Maximum number of retries (address 02H, defaulted 3)

Specify the maximum number of retries to be made for a remote or local station in case of data linking error.

Specify a number between between 1 and 7.

If data linking is not normally performed after the specified number of retries, the remote or local station is considered as 'data link failed station.'

Number of automatically reset stations (address 03H, defaulted 1)

Specify the number of remote/local stations that can be reset during a single link scan.

Specify a number between 1 and 10.

Operation status in case of CPU breakdown (address 06H, defaulted 0)

Choose to cease the data linking (set to 0) or continue (set to 1) when the CPU unit of the master station 'stops due to an error.'

Reserved stations (addresses 10H to 13H, defaulted 0)

Any of the remote/local stations specified as connected but not actually connected may be considered as data link failed. To prevent this, set the relevant bit(s) to 0. If any of the remote/local stations actually connected is specified as reserved, it will never be data-linked.

Set on the bits corresponding to the station Nos. of reserved stations.

For the unit occupying two or more remote/local stations, set on the bit corresponding to the station No. specified by the station No. select switches.

1 to 64 in the following table represent station Nos.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
10H	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
11H	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
12H	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
13H	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

Error invalid station (addresses 14H to 17H, defaulted 0)

Local/remote stations specified as error invalid are not considered as 'data link failed' by the master and remote stations if they cannot be data-linked due to power failure or for another reason. Note that no error can be detected at error invalid stations.

If they are also specified as reserved, they are considered as not connected.

Set on the bits corresponding to the station Nos. of the stations to be error-invalid.

For the unit occupying two or more remote/local stations, set on the bit corresponding to the station No. specified by the station No. select switches.

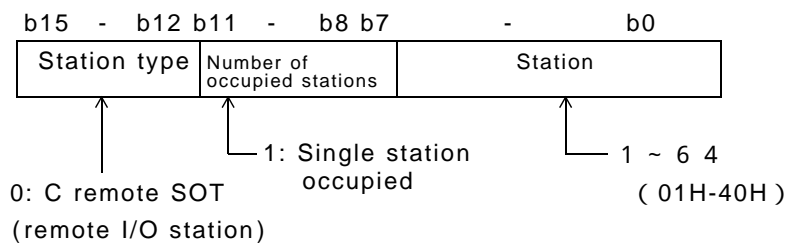
1 to 64 in the following table represent station Nos.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
14H	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
15H	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
16H	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33
17H	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

Station information (addresses 20H to 5FH)

Specify the type of each of the remote/local stations connected or specified as reserved.

Data structure



Buffer memory addresses are assigned to units as shown below.

Unit	Address	Unit	Address	Unit	Address	Unit	Address
1 st	20H	17 th	30H	33 rd	40H	49 th	50H
2 nd	21H	18 th	31H	34 th	41H	50 th	51H
3 rd	22H	19 th	32H	35 th	42H	51 st	52H
4 th	23H	20 th	33H	36 th	43H	52 nd	53H
5 th	24H	21 st	34H	37 th	44H	53 rd	54H
6 th	25H	22 nd	35H	38 th	45H	54 th	55H
7 th	26H	23 rd	36H	39 th	46H	55 th	56H
8 th	27H	24 th	37H	40 th	47H	56 th	57H
9 th	28H	25 th	38H	41 st	48H	57 th	58H
10 th	29H	26 th	39H	42 nd	49H	58 th	59H
11 th	2AH	27 th	3AH	43 rd	4AH	59 th	5AH
12 th	2BH	28 th	3BH	44 th	4BH	60 th	5BH
13 th	2CH	29 th	3CH	45 th	4CH	61 st	5CH
14 th	2DH	30 th	3DH	46 th	4DH	62 nd	5DH
15 th	2EH	31 st	3EH	47 th	4EH	63 rd	5EH
16 th	2FH	32 nd	3FH	48 th	4FH	64 th	5FH

6-3-3. Inputs/outputs of C remote SOT

Optical data inputs of the C remote SOT are always stored in the remote input (RX) area in the buffer memory of the master station through link scanning.

Data in the remote output (RY) area in the buffer memory of the master station is always sent to optical data outputs of the C remote SOT through link scanning.

Remote Inputs/Outputs

Signal direction: C remote SOT Master unit		Signal direction: Master unit C remote SOT	
Device No.	Description	Device No.	Description
RX00	Optical data inputs OUT 1	RY00-RX0F	Reserve
RX01	" OUT 2	RY10	Optical data outputs IN 1
RX02	" OUT 3	RY11	" IN 2
RX03	" OUT 4	RY12	" IN 3
RX04	" OUT 5	RY13	" IN 4
RX05	" OUT 6	RY14	" IN 5
RX06	" OUT 7	RY15	" IN 6
RX07	" OUT 8	RY16	" IN 7
RX08-RX0E	Not used	RY17	" IN 8
RX0F	RCV	RY18-RX1E	Not used
RX10-RX1F	Reserve	RY1F	CTL/TCD

OUT1 to 8 (RX00 to RX07)

Outputs the data sent from the normal SOT.

RVC (RX0F)

Set to '1' during stabilized reception.

IN1 to 8 (RY10 to RY17)

Inputs the data to be transmitted to the normal SOT.

CTL/TCD (RY1F)

The transmission and reception are ceased with SW2 off and RY1F on (CTL).

The transmission is ceased with SW2 on and RY1F on (TCD).

6-3-4. Remote input (RX) area

Remote inputs of the C remote SOT are stored in the remote input area in the buffer memory of the master station at the relevant addresses.

The correspondence between the station No. of the C remote SOT and the applicable buffer memory address is shown below.

Master Station Buffer Memory Addresses (C Remote SOT Master Station (RX))

Station No.	Buffer memory address	Station No.	Buffer memory address	Station No.	Buffer memory address	Station No.	Buffer memory address	Station No.	Buffer memory address
1	E0H-E1H	1 4	FAH-FBH	2 7	114H-115H	4 0	12EH-12FH	5 3	148H-149H
2	E2H-E3H	1 5	FCH-FDH	2 8	116H-117H	4 1	130H-131H	5 4	14AH-14BH
3	E4H-E5H	1 6	FEH-FFH	2 9	118H-119H	4 2	132H-133H	5 5	14CH-14DH
4	E6H-E7H	1 7	100H-101H	3 0	11AH-11BH	4 3	134H-135H	5 6	14EH-14FH
5	E8H-E9H	1 8	102H-103H	3 1	11CH-11DH	4 4	136H-137H	5 7	150H-151H
6	EA0-EBH	1 9	104H-105H	3 2	11EH-11FH	4 5	138H-139H	5 8	152H-153H
7	ECH-EDH	2 0	106H-107H	3 3	120H-121H	4 6	13AH-13BH	5 9	154H-155H
8	EEH-EFH	2 1	108H-109H	3 4	122H-123H	4 7	13CH-13DH	6 0	156H-157H
9	F0H-F1H	2 2	10AH-10BH	3 5	124H-125H	4 8	13EH-13FH	6 1	158H-159H
1 0	F2H-F3H	2 3	10CH-10DH	3 6	126H-127H	4 9	140H-141H	6 2	15AH-15BH
1 1	F4H-F5H	2 4	10EH-10FH	3 7	128H-129H	5 0	142H-143H	6 3	15CH-15DH
1 2	F6H-F7H	2 5	110H-111H	3 8	12AH-12BH	5 1	144H-145H	6 4	15EH-15FH
1 3	F8H-F9H	2 6	112H-113H	3 9	12CH-12DH	5 2	146H-147H	-	-

6-3-5. Remote output (RY) area

Remote outputs to the C remote SOT are stored in the remote output area in the buffer memory of the master station at the relevant addresses.

The correspondence between the station No. of the C remote SOT and the applicable buffer memory address is shown below.

Master Station Buffer Memory Addresses (Master Station (RY) C Remote SOT)

Station No.	Buffer memory address	Station No.	Buffer memory address	Station No.	Buffer memory address	Station No.	Buffer memory address	Station No.	Buffer memory address
1	160H-161H	1 4	17AH-17BH	2 7	194H-195H	4 0	1AEH-1AFH	5 3	1C8H-1C9H
2	162H-163H	1 5	17CH-17DH	2 8	196H-197H	4 1	1B0H-1B1H	5 4	1CAH-1CBH
3	164H-165H	1 6	17EH-17FH	2 9	198H-199H	4 2	1B2H-1B3H	5 5	1CCH-1CDH
4	166H-167H	1 7	180H-181H	3 0	19AH-19BH	4 3	1B4H-1B5H	5 6	1CEH-1CFH
5	168H-169H	1 8	182H-183H	3 1	19CH-19DH	4 4	1B6H-1B7H	5 7	1D0H-1D1H
6	16A0-16BH	1 9	184H-185H	3 2	19EH-19FH	4 5	1B8H-1B9H	5 8	1D2H-1D3H
7	16CH-16DH	2 0	186H-187H	3 3	1A0H-1A1H	4 6	1BAH-1BBH	5 9	1D4H-1D5H
8	16EH-16FH	2 1	188H-189H	3 4	1A2H-1A3H	4 7	1BCH-1BDH	6 0	1D6H-1D7H
9	160H-171H	2 2	18AH-18BH	3 5	1A4H-1A5H	4 8	1BEH-1BFH	6 1	1D8H-1D9H
1 0	172H-173H	2 3	18CH-18DH	3 6	1A6H-1A7H	4 9	1C0H-1C1H	6 2	1DAH-1DBH
1 1	174H-175H	2 4	18EH-18FH	3 7	1A8H-1A9H	5 0	1C2H-1C3H	6 3	1DCH-1DDH
1 2	176H-177H	2 5	190H-191H	3 8	1AAH-1ABH	5 1	1C4H-1C5H	6 4	1DEH-1DFH
1 3	178H-179H	2 6	192H-193H	3 9	1ACH-1ADH	5 2	1C6H-1C7H	-	-

6-4. Data processing time

The data processing time by the C remote SOT is calculated as follows.

6-4-1. Time required for transmitting data

$$\text{Maximum processing time} = \text{MS} + \text{LS} \times 2 + \underline{\text{optical transfer time} \times 2}$$

6-4-2. Time required for uploading received data

$$\text{Maximum processing time} = \text{MS} \times 2 + \text{LS} \times 2$$

MS: Scan time by sequence program of master station

LS: Link scan time

Optical transfer time: Time required for optical transfer from C remote SOT to normal SOT

M/S mode : 15ms MAX

X mode : 20ms MAX

The link scan time for the CC-Link is calculated as follows.

$$\text{LS} = \text{BT} \{ 29.4 + (\text{NI} \times 4.8) + (\text{NW} \times 9.6) + (\text{N} \times 32.4) + (\text{ni} \times 4.8) + (\text{nw} \times 9.6) \} + \text{ST} \\ + \text{number of communication failed stations} \times 48 \times \text{BT} \times \text{number of retries}^2$$

*2 : This term is required when one or more communication failed stations exist.

BT: A constant (baud rate)

NI: The largest station No. of a, b and c
(including all occupied stations)

NW: The latest station No. of b and c
(including all occupied stations)

N: Number of connected stations

ni: a + b + c

nw: b + c

ST: A constant (the largest of , and)

800 + (a × 15)

900 + (b × 50)

If c ≤ 26, 1200 + (c × 100)

If c > 26, 3700 + {(c - 26) × 25}

a: The total number of occupied remote I/O stations

b: The total number of occupied remote device stations

c: The total number of occupied intelligent device stations (including local ones)

6-5. Programming

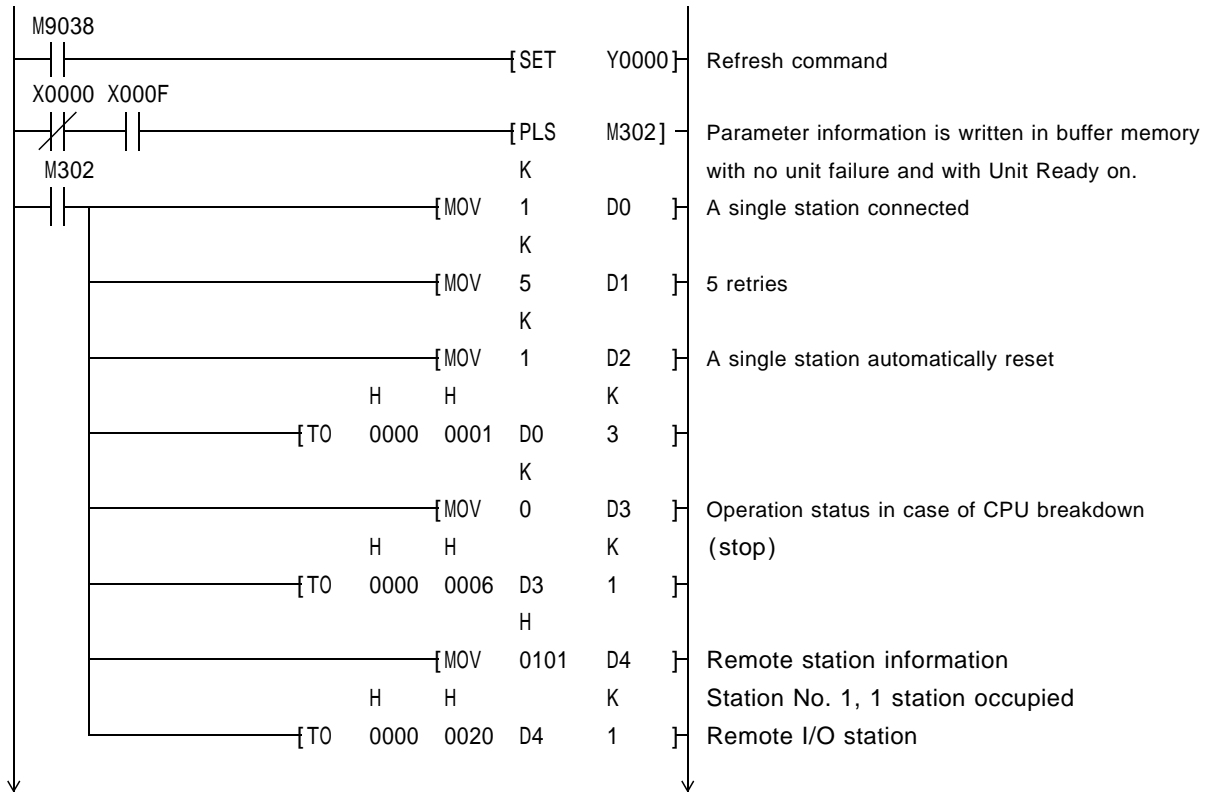
Prepare a PC program using the following example.
 This section gives a description assuming the ACPU, AJ61bT11 and C remote SOT set as follows for your reference.

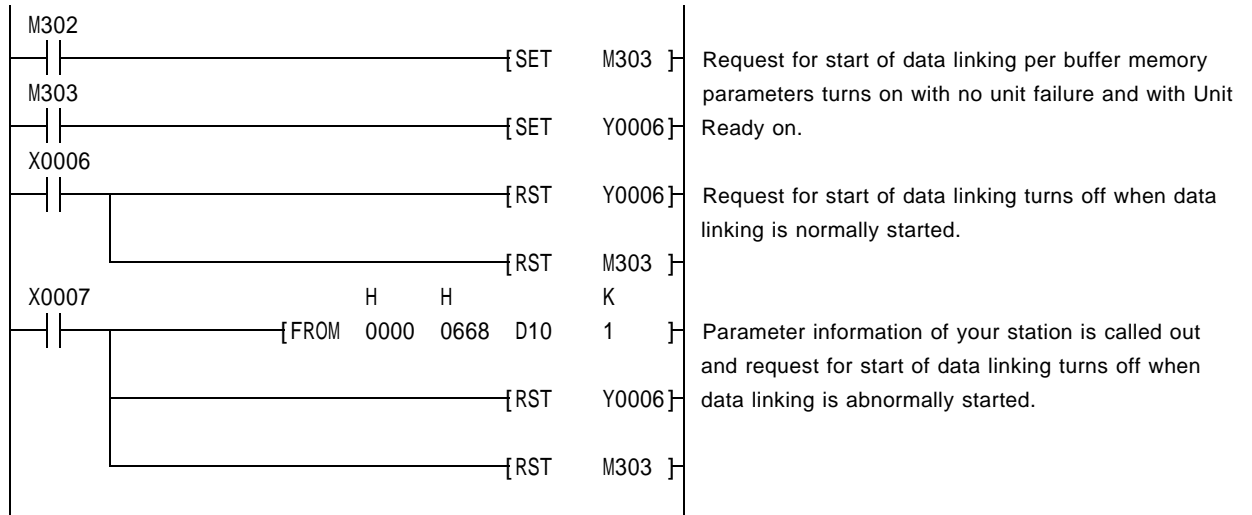
Example of system construction
 AJ61BT11 is installed in 0 slot.
 Station No. of C remote SOT is 1.
 Only a single C remote SOT is connected.
 Transmitted data is stored at B0010 to B001F and received data at B0000 to B000F.

• Station No.01

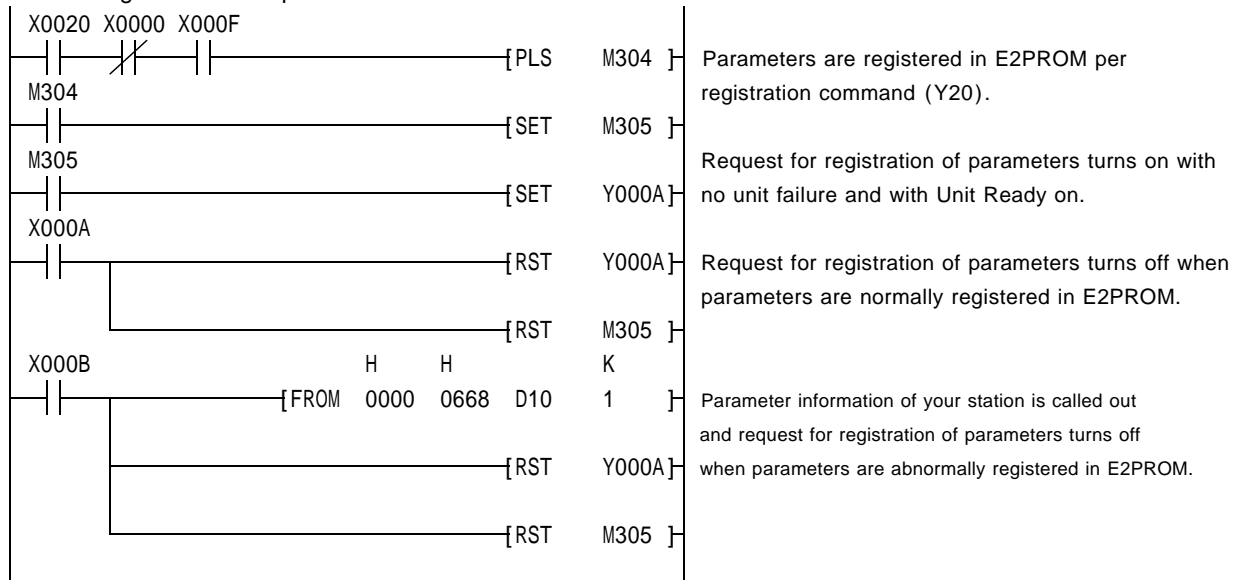
(1) Parameters setting program

An example program for setting parameters is shown below.
 Data linking per buffer memory parameters (in debugging)

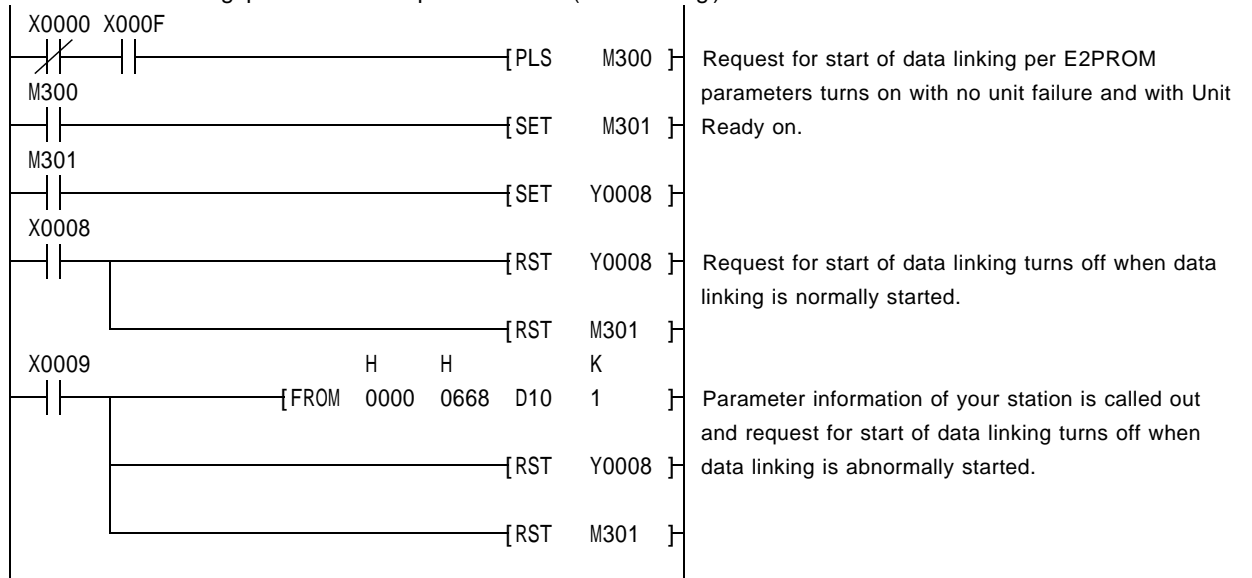




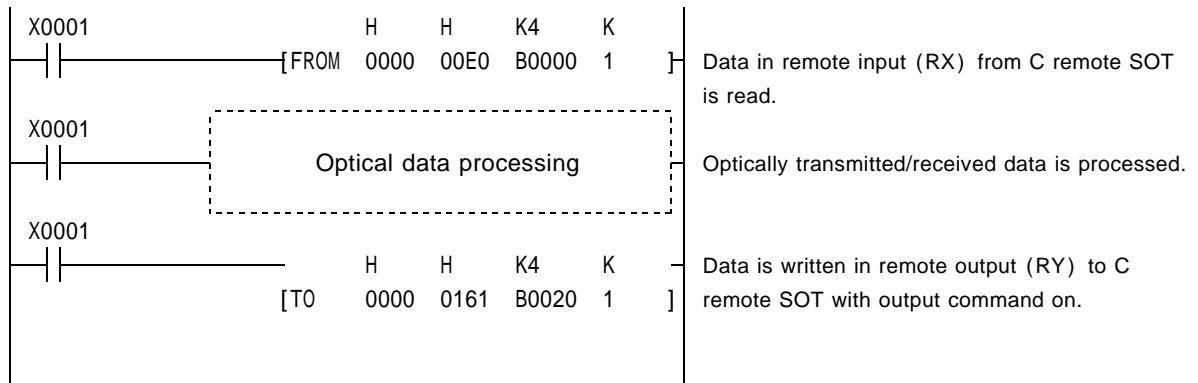
Registration of parameters in E²PROM



Data linking per E²PROM parameters (in running)



(2)Transmission/reception process



6-5-3.Caution in preparing a program

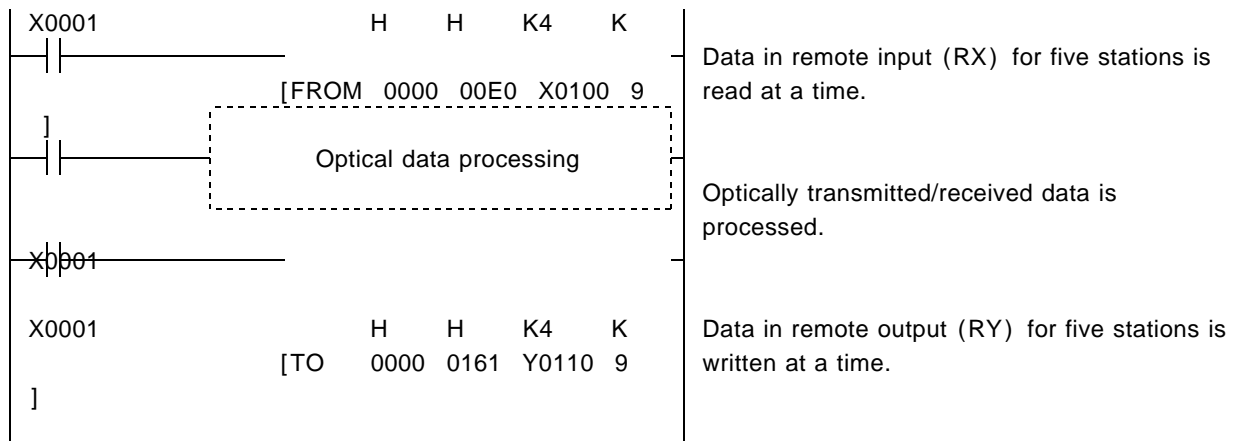
For communication with remote/local stations connected with the master station, the refresh command (Yn0) and request for start of data linking (Yn6 or Yn8) should have been on before any instruction can be executed.

When debugging, write necessary information in the parameter information area of the master station buffer memory and turn on the request for start of data linking per buffer memory parameters (Yn6). When running, register parameters in the E²PROM and turn on the request for start of data linking per E²PROM parameters (Yn8).

The C remote SOT input/output signals marked with "reserved" are used by the main system. If this signal is used (turned on) in the PC program, the C remote SOT functions may be interrupted.

Every time the TO/FROM command is executed, the master unit will be occupied to process the data. So the number of the TO/FROM commands in the program you prepare should be as small as possible. (An excessively large number of TO/FROM commands may prevent the master unit from automatically resetting the number of remote stations.)

Refer to the example of five stations shown below.



7. Trouleshooting

7-1. In case a problem occurs

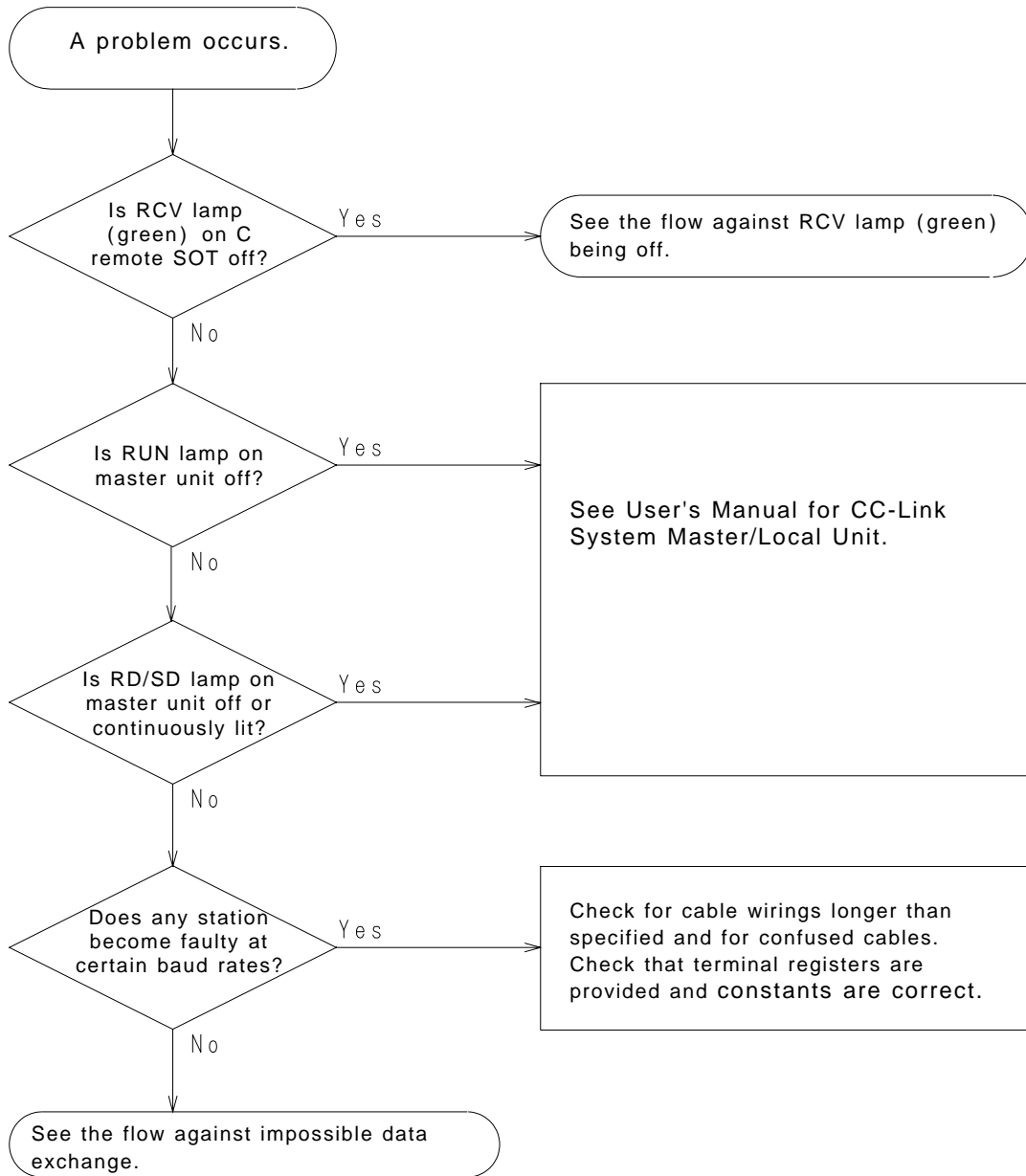
The check items and corrective action against each problem are listed below.

Symptom	Check item	Check method
Entire system cannot be data-linked.	Cable connections	Check cables with eyes or circuit tester. Check circuit status (SW0090).
	Terminal registers	Connect terminal registers to units at both ends. Check that terminal resistors are compatible with cables.
	Error at master station CPU	Check error code on sequencer CPU and take corrective action.
	Parameter settings	Check contents of parameters.
	Request for start of data linking	Check that request for start of data linking (Yn6 or Yn8) has been on.
	Error at master station	Check parameter status of your station (SW0068), switch status (SW006A), mounting status (SW0069) and blinking of ERR LED on master station.
	Synchronized mode	If scan time exceeds the maximum limit in synchronized mode, switch to non-synchronized mode or reduce baud rate.
Data cannot be exchanged with remote station.	Data linked?	Check LEDs on remote station and master station's communication status with other stations.
	Station reserved?	Check contents of parameters.
	Station No. consistent with parameters?	Check contents of parameters and remote station No.
	Station No. duplicated?	Check remote station No.
	Correct address?	Check that address corresponding to station No. is used.
Faulty station cannot be detected.	Error invalid station?	Check contents of parameters.
	Station No. duplicated?	Check remote station No.
Remote station does not start up.	Parameter settings consistent with unit settings?	Check contents of parameters and remote station No.
	Station No. duplicated?	Check remote station No.
Some stations become faulty at certain baud rates.	Check faulty stations' communication status with other stations (SW0080 to 83).	Check switch settings of faulty stations.
	Restored to normal condition at lower baud rate?	Check that cables are correctly grounded. Check cable wirings (for confusion and poor connection). Check that terminal resistors are compatible with cables.
Optical transmission is impossible.	Correct address?	Check that address corresponding to station No. is used.
	Optical transmission stopped?	Check that CTL/TCD is off.
Optical reception is impossible.	Correct address?	Check that address corresponding to station No. is used.
	Other station powered?	Check that POW lamp on other station is lit.
	Any data transmitted from other station?	Check that CTL/TCD on other station is off.
	Optical axis correctly located?	Check that optical transfer status lamp (RCV) is lit.
	Optical reception stopped?	Check that CTL is off.
Automatic resetting of the number of stations	TO/FROM commands excessive in number	Reduce the number of TO/FROM commands or the baud rate.

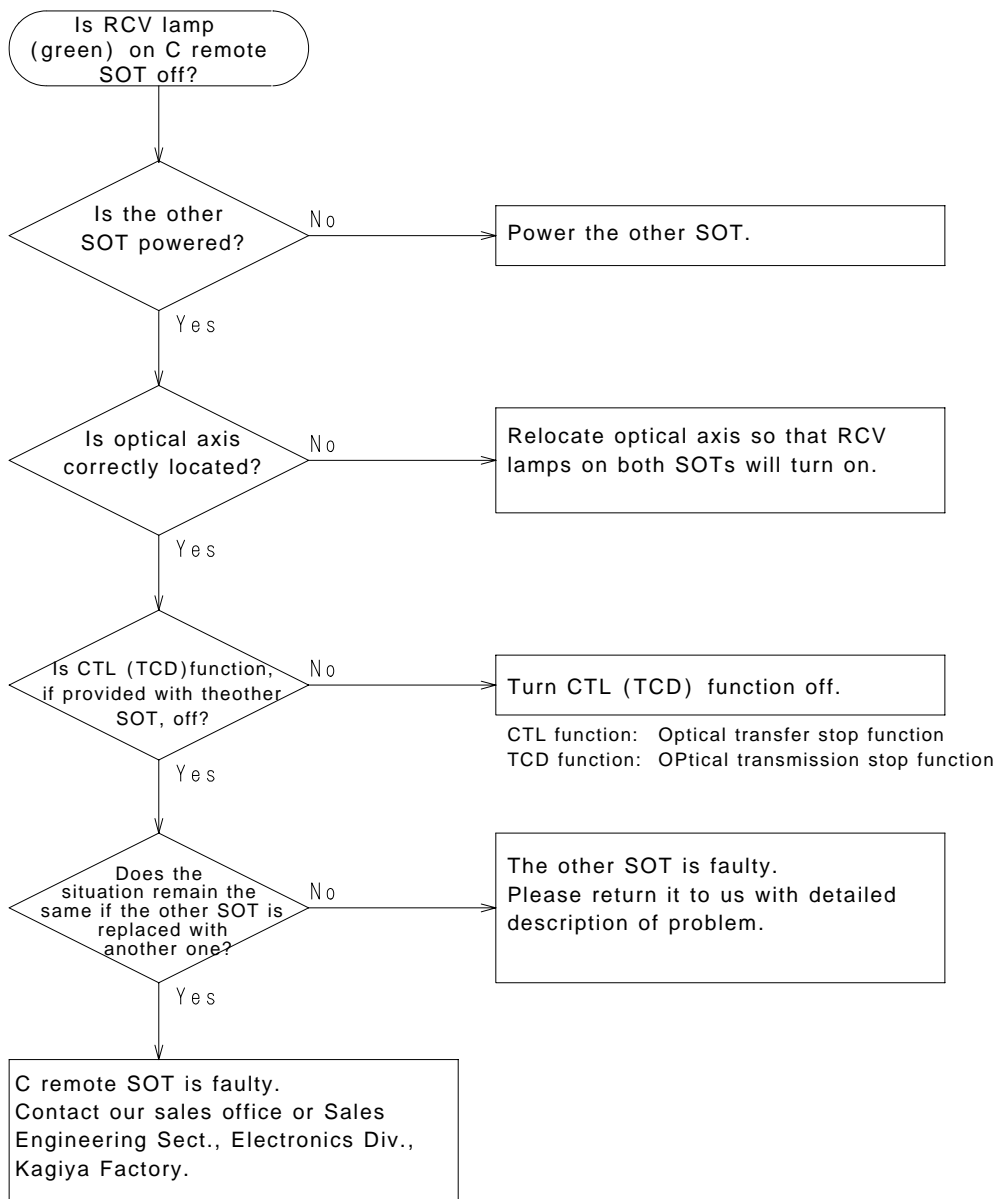
7-2.Troubleshooting

Simple troubleshooting procedures against problems in communication with C remote SOTs are shown below. For problems related with CPU units and master/slave units, see the relevant user's manual.

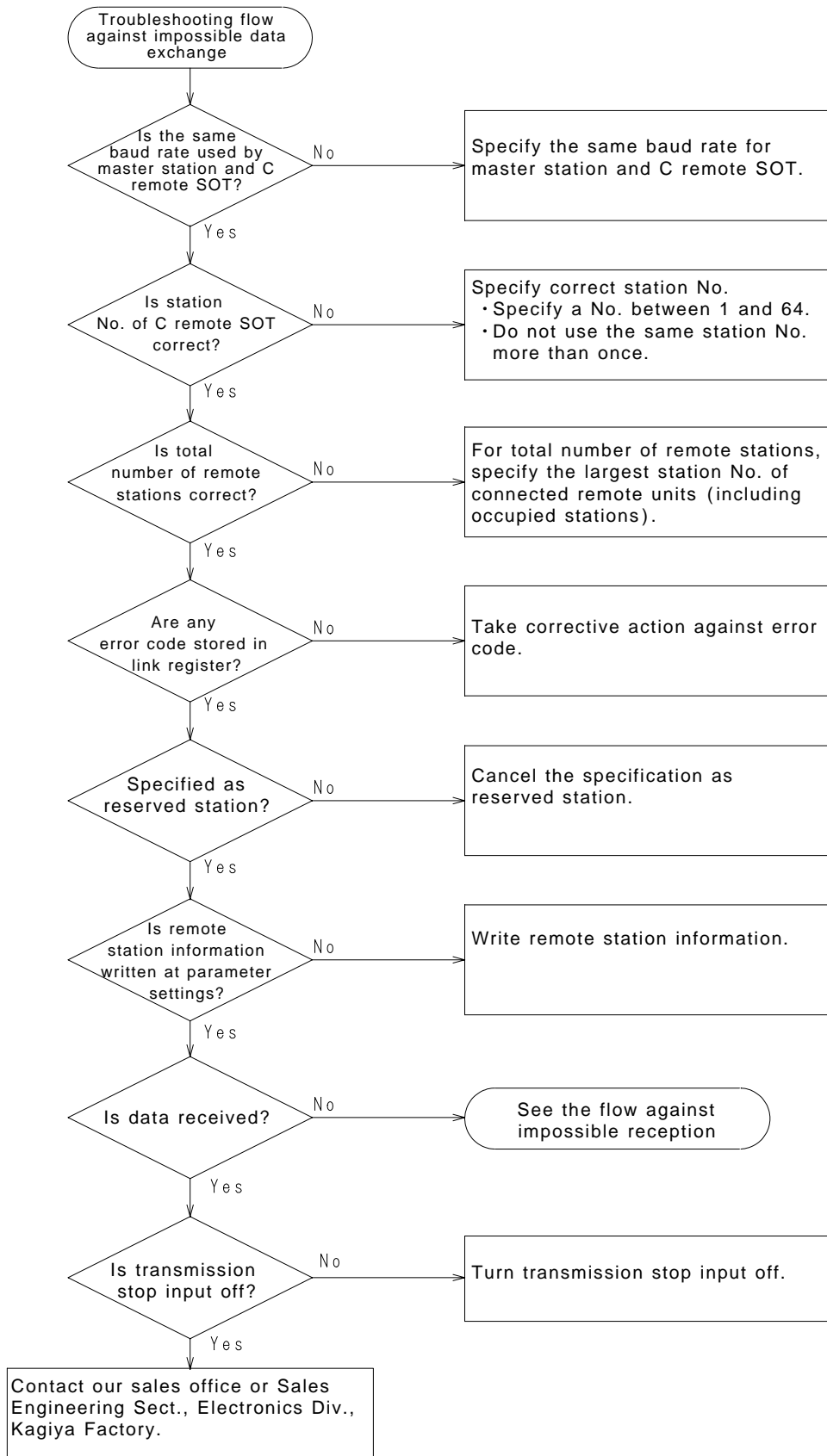
7-2-1.Troubleshooting flow



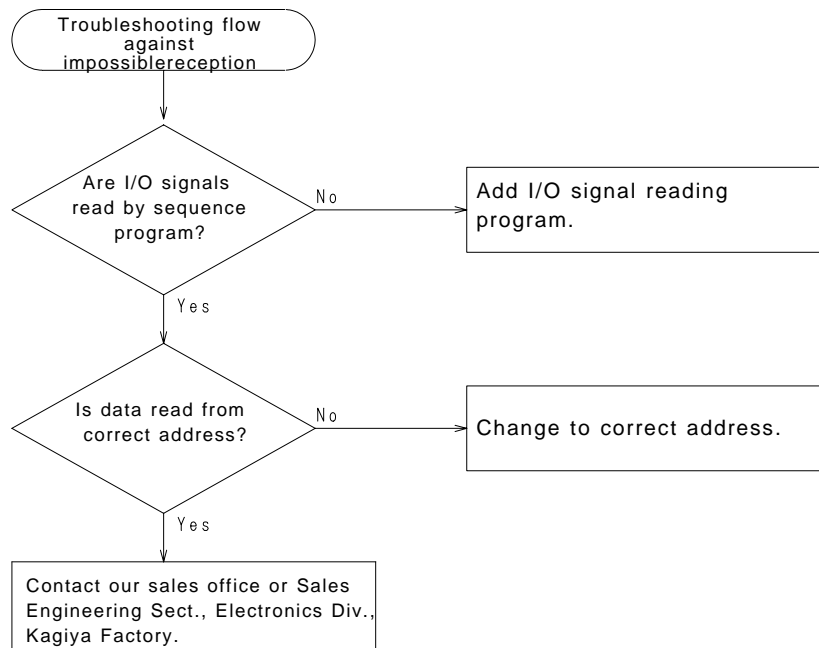
7-2-2.If the RCV lamp (Green) is off



7-2-3.If data cannot be exchanged



7-2-4. In case of impossible reception



8. Maintenance and Inspection

The SOT-CP 801 series products should be serviced according to the following schedule. The check frequency is only shown for your reference and should be changed in consideration of the conditions of use and environmental conditions.

Caution: When servicing, take adequate safety measures so that no equipment around the unit will not accidentally move.

Check item	Description	Check frequency
Clean optical axis surface.	Wipe out transmitter/receptor opening surface with soft cloth. Do not use any solvent such as paint thinner and alcohol.	Every 3 months
Clean nameplate.	Wipe out nameplate with soft cloth so that it reads clearly. Do not use any solvent such as paint thinner and alcohol. If nameplate is peeled off or becomes illegible, replace with a new one (supplied at your cost).	
Check communication range.	Determine the range where RCV lamp on main body lights to check for optical axis shift.	
Check for loose screws.	Check each part of main body for loose screws.	
Check cables.	Check cables and connectors for damage.	

9. Specifications

9-1.CC-Link specifications

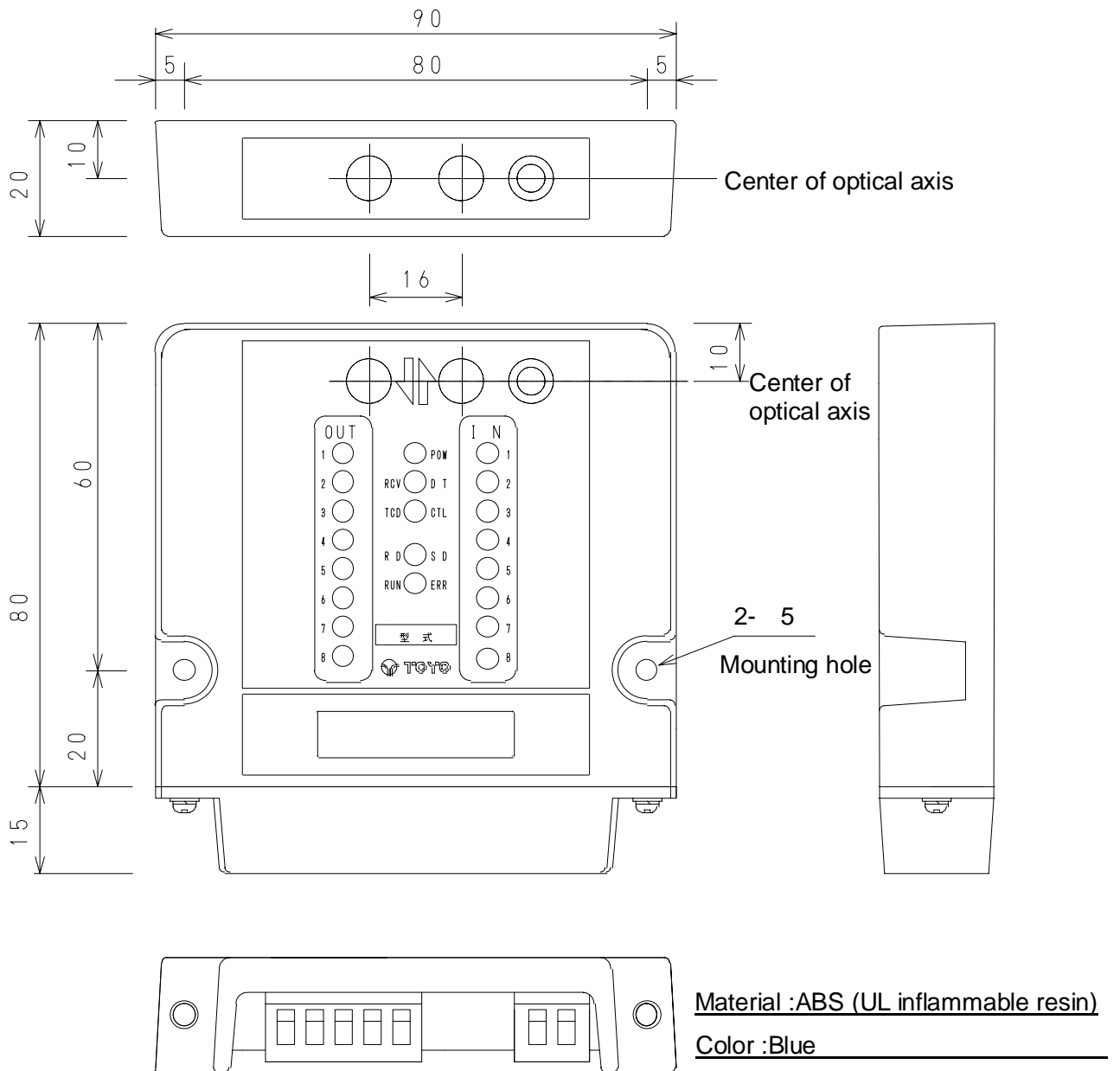
Item	Specification
Applicable sequencer	MELSEC A/QnA/Q series, Mitsubishi Electric
Applicable master unit	AJ61BT11,A1SJ61BT1,AJ61QBT11,A1SJ61QBT11,QJ61BT11
Communication method	Control & Communication Link (CC-Link)
No. of occupied stations	1
Transfer route	Bus
Transfer format	HDLC
Link connecting means	Connector terminal block (MSTB 2.5/5-ST-5.08, Phoenix Contact)
Connecting cable	CC-Link dedicated cable
Maximum transfer distance	1200 to 100 m (depending on baud rate)
Baud rate	10 M, 5 M, 2.5 M, 625 K or 156 Kpbs

9-2.Optical transfer specifications

Item	Specification			
Model	SOT-CP801H	SOT-CP801S	SOT-CP803H	SOT-CP803S
Optical axis direction	Head-on	Side-on	Head-on	Side-on
Rated voltage	DC24V			
Operating voltage	DC 18-30 V			
Current consumption	100mA MAX			
Transfer distance	0 to 1 m (with light intensity control knob set to MAX)		0 to 3 m (with light intensity control knob set to MAX)	
Emitting direction	30 degrees or more (at 1 m distance)		5 degrees or more (at 3 m distance)	
Transfer method	Semi-dual bi-directional			
Detection method	Continuous monitoring of bit status changes			
Transfer time	15 ms max. (in M/S mode) or 20 ms max. (in X mode)			
Projector element	Near infrared light emitting diode			
Receiver element	Photo-transistor			
No. of transfer bits	8 input bits and 8 output bits			
No. of control inputs	1 (CTL/TCD)			
No. of control outputs	1 (RCV)			
Switches	Station No. select switches (2 rotary switches) Baud rate select switch (a rotary switch) Mode select switches (dip switches)			
Indicator lamps	POW lamp: Lights (red) with power supply on. CTL/TCD lamp: Lights (red) with CTL input on. Lights (green) with TCD input on. D T/RCV lamp: Lights (red) when data is normally received. Lights (green) during stabilized reception. IN lamp: Lights (red) with relevant optical output data on. OUT lamp: Lights (green) with relevant optical input data on. RUN lamp: Lights (green) during normal data exchange with master unit. ERR lamp: Lights (red) with data error received and turns off during normal communication. SD lamp: Lights (red) during linked data transmission. RD lamp: Lights (red) during linked data reception.			

Item	Specification
Operating ambient temperature	-20 to 50 deg C (no condensation allowed during operation)
Operating ambient humidity	40 to 85%RH (no condensation allowed)
Operating ambient illuminance	4,000 Lx or less (no disturbing rays should directly enter receiver)
Vibration resistance	10 to 55Hz, 1.5mm dual amplitude 2 hours each in X, Y and Z directions
Impact resistance	500 m/s ² (approx. 50G), 2 hours each in X, Y and Z directions
Protection class	IP40
Power supply connection	Connector terminal block (MSTB 2.5/2-ST-5.08, Phoenix Contact)
Physical dimensions	90mm (W)×80mm (D)×20mm (H) (for detail, see the schematic in section 10)

10. Schematic



11. Settings and Procedure

11-1. Guarantee period

An year after delivery to the specified location

11-2. Scope of Guarantee

If any part of the product is found to have a fault attributable to us during the guarantee period as defined above, it will be replaced or repaired at our cost.

This does not apply when:

- the product has been incorrectly handled or used by the user,
- the fault was caused for a reason not related with the product,
- the product has been altered or repaired by the third party, or
- the fault was caused by a natural disaster or another accident unavoidable by us.

We only guarantee the product itself and take no responsibility for any secondary damage resulting from the use of the product.

12. Revision History

Date	Content of change	Responsibility
Jan . 1999	First issue	Development section (No.2)
May. 1999	Specification for 3-meter setting distance is added	Development section (No.2)
Jun. 1999	Description of terminal resistance is added ("B") TRE setting and output mode are changed	Development
Aug. 1999	"Caution in preparing a program" (with TO/FROM commands) is added ("C")	Development
Sep. 2000	Changed to ensure compatibility with CC-Link Ver. 1. 10 ("D")	Development
	The following is the space	