MELSEC A-Series

PROGRAMMABLE CONTROLLER

User´s Manual

Art.-No.: 20445 – 940330 – E

MELSECNET/MINI-S3 master module type AJ71PT32-S3

MITSUBISHI ELECTRIC EUROPE GMBH
INDUSTRIAL AUTOMATION

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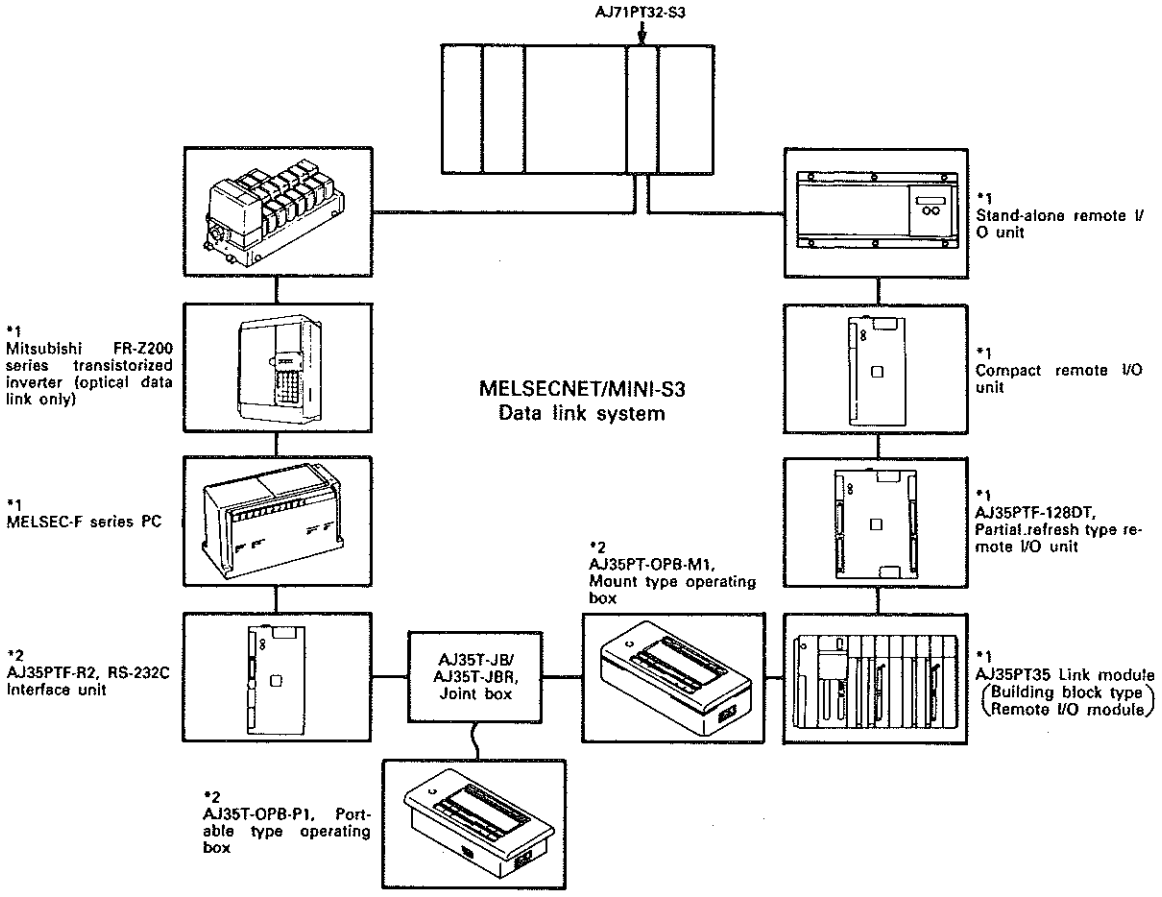
1. INTRODUCTION

This manual includes specifications, communication processing methods and handling instructions of MELSECNET/MINI-S3 data link system (referred to as "MINI-S3") and the AJ71PT32-S3 MELSECNET/MINI-S3 master module (referred to as master module).

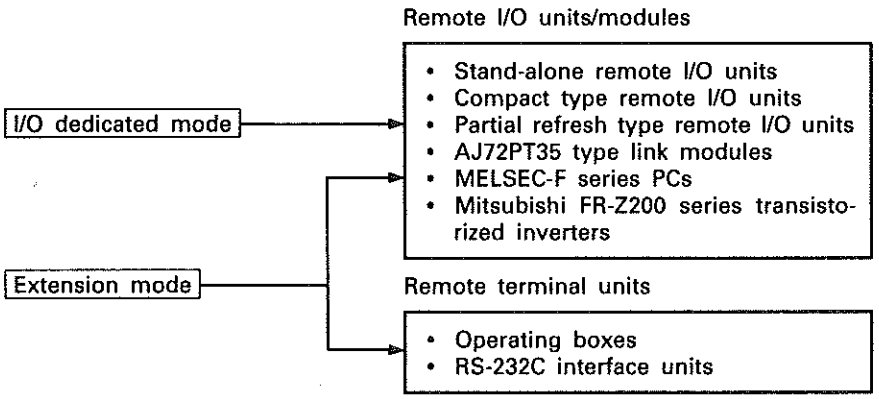
The MINI-S3 link is installed in either the master module or main base unit and is configured of remote I/O units and remote terminal units that are connected by optical fiber or twisted-pair cables as indicated below.
This system is designed to reduce wiring work costs for I/O devices installed away from the PC CPU. For example, remote I/O stations installed to a conveyor line, machines and equipment, etc. can be controlled from the master module via optical fiber or twisted-pair cables.
The MINI-S3 link can also be connected to and used to control the FR-Z200 series transistorized inverter, the operation box (display and key input equipment, and the RS-232C interface unit.
(The RS-232C interface unit can be used to connect bar-code readers, ID card controllers, and other peripheral equipment that conforms to the RS-232C specification.)



Note that the following terminology is used in this manual: *1 units are referred to as remote I/O units; *2 units as remote terminal units; and, when both are referred to, as remote units.

The AJ71PT32-S3 master module provides two operation modes, the I/O dedicated mode and the extension mode, that are selected depending on the types of units and modules connected to the master module.
The I/O dedicated mode is used only to control remote I/O units. The extension mode is used to control either or both remote I/O units and remote terminal units.

(1) The following figure indicates the types of units/modules that can be configured in each of the two modes



(2) Usages differ depending on which of the two modes is being used as indicated below. (Communication methods remain the same.)
1) Number of I/O points occupied for the AJ71PT32-S3 master module
I/O dedicated mode ····· 32 points
Extension mode ····· 48 points
2) Setting initial data
I/O dedicated mode ····· Initial data is set by sequence program.
Extension mode ····· Initial data is set by either the initial data ROM or by the sequence program. Initial data is written to the initial data ROM from the SW□GP-MINIP type system floppy disk.
3) The device numbers for the PC CPU and the I/O signals of the units and modules differ. (For further information, see Section 3.9.)

(3) The modes are switched by the mode switch jumper. (For further information, see Section 5.3.1.)

(4) It is recommended that the I/O dedicated mode be used when only remote I/O units are connected.
The number of occupied points are decreased and initial data settings can be done more easily using the sequence program. Also the I/O dedicated mode enables AJ71PT32-S3 master module to be replaced with AJ71PT32 master module without having to modify the sequence program.
(For further information, see Appendix 1.)

1.1 MINI-S3 Link Features

(1) Communication with maximum of 64 remote units
Each master module can control a maximum of 64 stations configured of either or a combination of remote I/O units and remote terminal units.
However, the total number of remote terminal units that can be connected is 14.
Remote I/O units occupy 1 to 16 stations per unit.
Remote terminal units occupy 4 stations per unit.
For further information, see Section 3.6.

(2) High-speed I/O refresh (communication processing)
Communication processing occurs between the master module and remote units at 3.5 to 18ms intervals.
The I/O refresh period varies depending on the remote units that are connected.
For further information, see Section 4.2.

(3) I/O refresh method

(a) Remote I/O units provide either batch refresh or partial refresh capabilities depending on the type of remote I/O unit.
1) Batch refresh
Batch refreshing processes all of the I/O data in one I/O refresh (reading/writing).
2) Partial refresh
Partial refreshing processes I/O data over a series of I/O refreshes (reading/writing).
Partial refreshing allows a few occupied stations to control many I/O points. For example, 64-input and 64-output points can be controlled by the AJ35PTF-128DT which occupies 4 stations.

(b) Remote terminal units process communication data over a series of I/O refreshes (reading/writing).
This means that large volumes of data can be communicated without effecting I/O refresh with other remote units connected in the same system.

(4) Remote I/O unit types
The following remote I/O units and module are available:

(a) Stand-alone remote I/O unit
The stand-alone remote I/O unit has a high-strength, drip-proof casing made of aluminum diecast for installation onto a machine and may be used for a relay box. Its protective structure conforms to IP54G (JEM1030).

(b) Compact type remote I/O unit
Same in style as the A0J2 I/O units. Available number of I/O points is 32/24 points and 16/12 points.

(c) Partial refresh type remote I/O unit
Refreshes remote I/O station data in groups of given points.
Allows many I/O points to be controlled with a few stations occupied by the master module.

(d) AJ72PT35 link module
This remote I/O unit enables the A series building-block type I/O modules to be used in the MINI-S3 link system.

(5) Remote terminal I/O unit types
The following two types of remote terminal units are available.

(a) AJ35PT-OPB-M1, and AJ35PT-OPB-P1 operating boxes
These units provide an LCD character display (3 lines by 30 columns), 8 LEDs, and 8 sheet keys and 24 touch keys. The LCD permits display of the alphanumeric, special, and user-defined characters.
(For further information concerning the operating box, see the AJ35PT-OPB-M1/AJ35PT-OPB-P1 Operating Box User's Manual.)

(b) AJ35PTF-R2 type RS-232C interface unit
(The RS-232C interface unit is used for communication between the MINI-S3 link and peripheral equipment such as bar-code readers, ID card controllers, and other peripheral equipment that conforms to the RS-232C specification. The RS-232C interface unit provides one channel and four I/O signal points.
For further information concerning the bar-code readers and ID card controllers that can be connected, see Sections 3.5.1 and 3.5.2.
The communication protocol used by the RS-232C with peripheral equipment is no-protocol.
(For further information concerning the AJ35PTF-R2, see the AJ35PTF-R2 RS-232C interface unit User's Manual.)

(6) The MINI-S3 link can be used in a MELSECNET since it is independent of MELSECNET link system.
Any master station of a two-tier or three-tier or a local station in the MELSECNET may be used as a MINI-S3 link master station.

(7) Ease of machining optical cable connectors
Optical cable connectors can be machined easily by the user with the tool kit available from Mitsubishi.

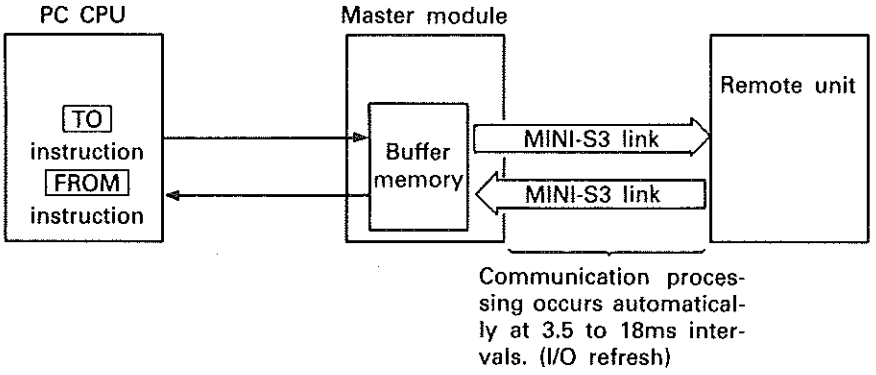
(8) Ease of checking luminous energy in optical data link system
In luminous energy check mode of the master module, luminous energy can be checked by connecting the optical power tester to the receive connecter of each remote I/O station.

REMARKS

The MINI-S3 link does not have a loopback function as it has only one loop of data link cables.

1.2 Communication

MINI-S3 link communication processing occurs between the buffer memory of the master module and each of the remote units automatically at 3.5 to 18ms intervals, regardless of the sequence program scan.



The term "I/O refresh" will be used to signify communication between the master module and remote units throughout the rest of this manual.

(1) Data transmission between the PC CPU and each of the remote units is conducted by writing the transmitted data in the buffer memory of the master module, upon which it is automatically transmitted to each of the remote units upon I/O refresh. Data is written to the master unit buffer memory using the TO instruction of the sequence program.

(2) The data received from each of the remote units is automatically written to the buffer memory of the master module upon I/O refresh.
The data received in the master module is read by the PC CPU using the FROM instruction of the sequence program.

(3) For further information concerning communication processing, see Section 3.

1.3 Related Manuals

The following manuals are available for reference when using the MINI-S3 link.

(1) Batch Refresh Type Remote I/O Unit User's Manual
This manual provides information concerning the specifications, handling, and programming for the stand-alone remote I/O units, compact type remote I/O units, and AJ71PT35 type link units.

(2) AJ35PTF-128DT Type Partial Refresh Type Remote I/O Unit User's Manual
This manual provides information concerning the specifications, handling, and programming for the AJ35PTF-128DT partial refresh type remote I/O unit.

(3) AJ35PT-OPB-M1/AJ35PT-OPB-P1 operating box User's Manual
This manual provides information concerning the specifications, handling, and programming for the AJ35PT-OPB-M1 mount type operation box, the AJ35PT-OPB-P1 portable type operation box, and the AJ35T-JB/JBR joint box.

(4) AJ35PTF-R2 RS-232C interface unit User's Manual
This manual provides information concerning the specifications, handling, and programming for the AJ35PTF-R2 RS-232C interface unit.

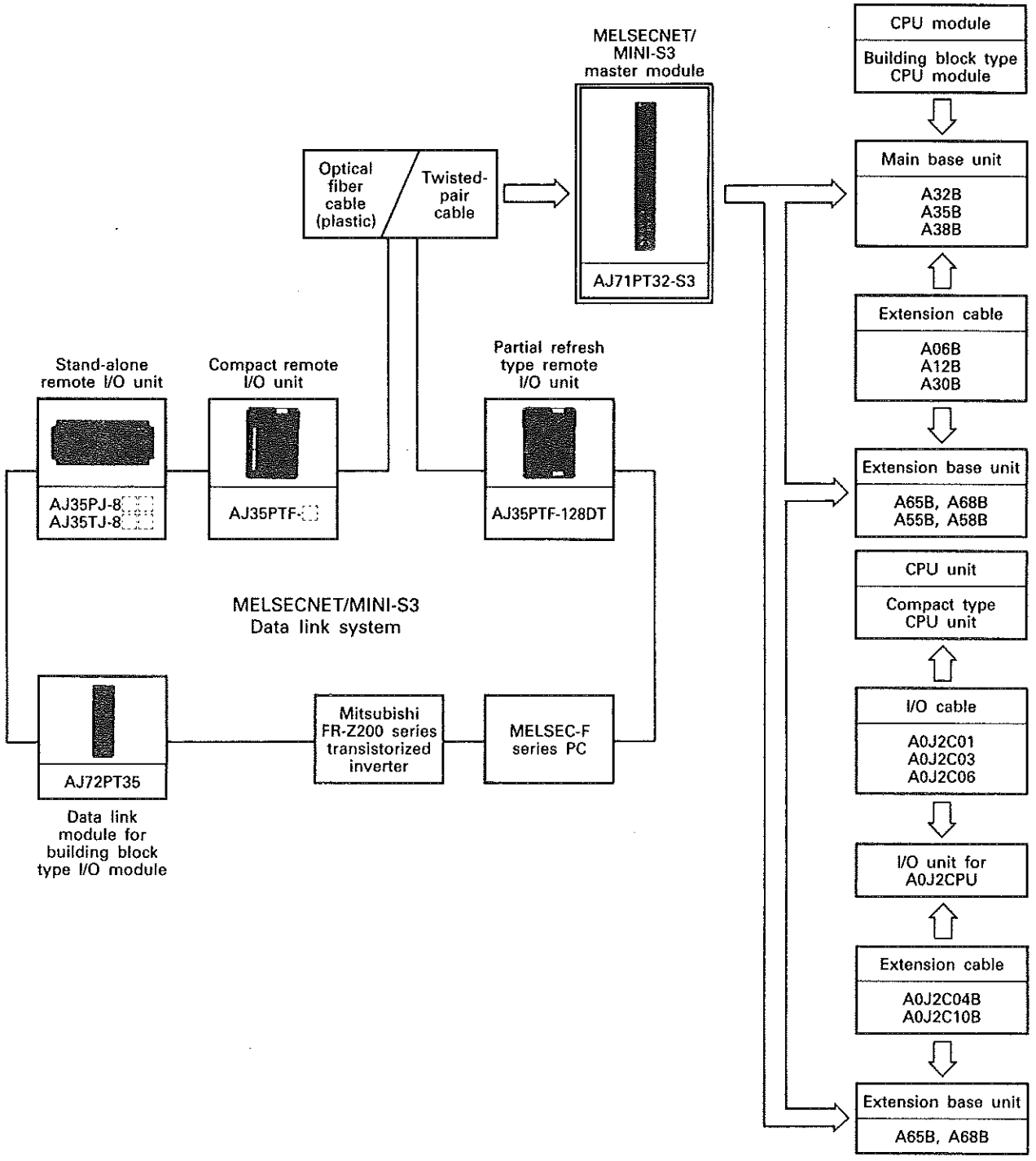
(5) SW0GP-MINIP Operating Manual
This manual provides information concerning programming for the initial data ROM when the master module is used in the extension mode, for the message ROM and character generation ROM when the operating box is used.

(6) For information concerning the specifications, handling, and programming for the MELSEC-F series PC and Mitsubishi FR-Z200 series transistorized inverter, see the appropriate manuals.

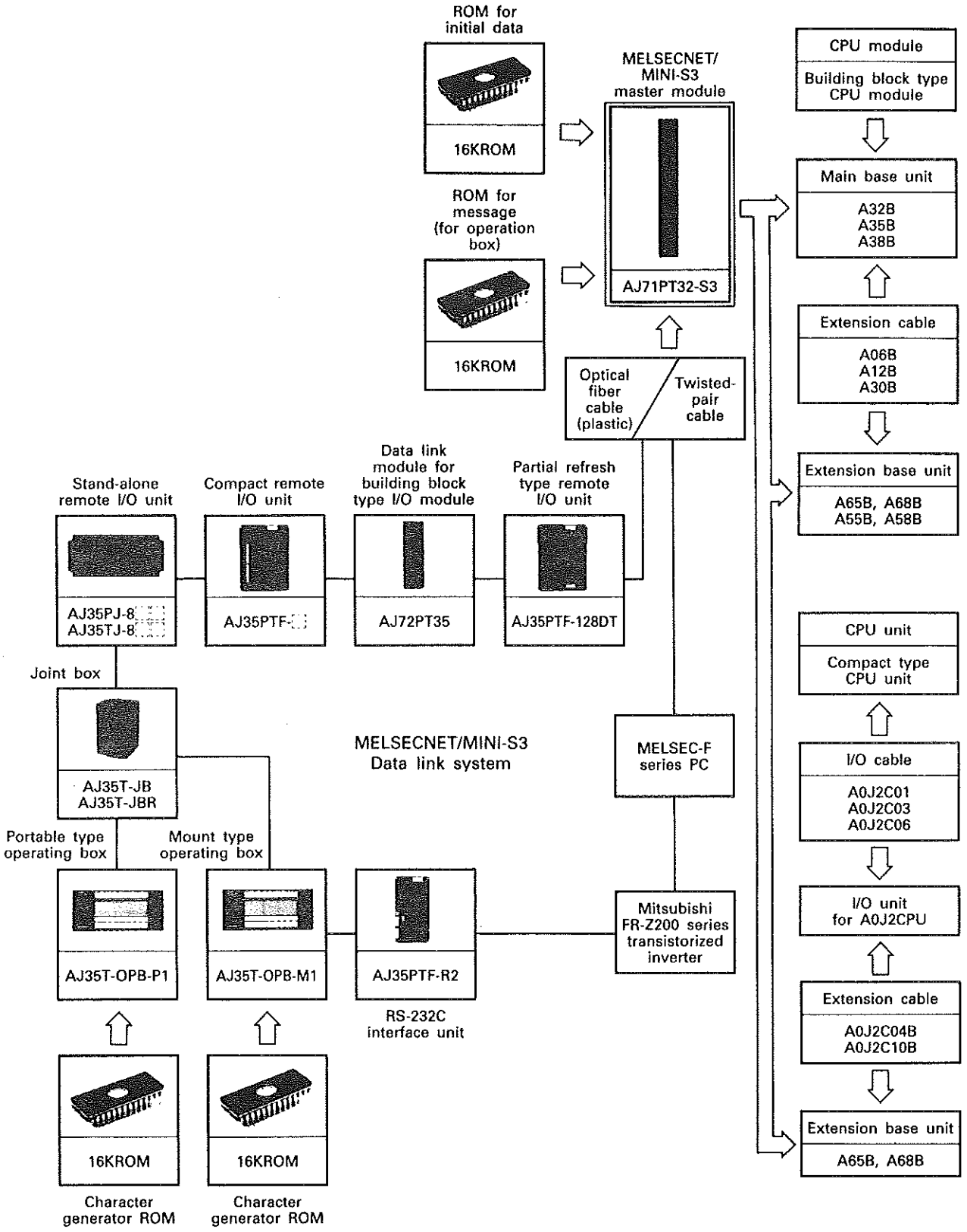
2. SYSTEM CONFIGURATION

2.1 Overall Configuration

2.1.1 System configuration (I/O dedicated mode)



2.1.2 System configuration (extension mode)



2.2 Applicable A-Series System

2.2.1 Applicable CPU

The master module can be used with the following CPU models:

Applicable models		
	A0J2CPU	
	A1NCPU	A1(E)CPU
	A2NCPU	A2(E)CPU
	A3NCPU	A3(E)CPU
	A3HCPU	

There is no limit to the number of master modules loaded. The master module may be loaded on any slot of the base unit with the following precautions:

(1) When using the master module with the A55B or A58B extension bases (i.e. those without power supplies), select the power supply for the main base unit in accordance with the corresponding CPU User's Manual.

(2) The master module cannot be loaded in the last slot in the 7th extension stage of the A3CPU (P21/R21).

(3) Master modules can be installed in either the master station or local station but not in the remote I/O stations.
The CPU models that can be used in the master and local stations are listed below.

Applicable models to master stations		
	A1NCPUP21/R21	A1(E)CPUP21/R21
	A2NCPUP21/R21	A2(E)CPUP21/R21
	A3NCPUP21/R21	A3(E)CPUP21/R21
	A3HCPUP21/R21	

Applicable models to local stations		
	A0J2CPUP21/R21	
	A1NCPUP21/R21	A1(E)CPUP21/R21
	A2NCPUP21/R21	A2(E)CPUP21/R21
	A3NCPUP21/R21	A3(E)CPUP21/R21
	A3HCPUP21/R21	

2.2.2 Notes on configuring the system

(1) Use the master module in the extension mode when remote terminal units (operating box, RS-232C interface unit) are used.

(2) Note that the number of occupied points varies for the master module depending on whether it is being used in the extension mode or the I/O dedicated mode.
Extension mode ····· 48 points
I/O dedicated mode ····· 32 points

(3) Create the initial data ROM using SW□GP-MINIP type system floppy disk and install it in the master module when it is used in the extension mode.
The ROM does not need be installed when the master module is used in the I/O dedicated mode.

(4) Create the message ROM and character generation ROM using the SW□GP-MINIP type system floppy disk when using the operating box. Install the message ROM in the master module and the character generation ROM in the operating box.

(5) The precautions indicated in (a) and (b) must be taken to prevent error inputs to the remote I/O units in the MINI-S3 link.

(a) Prevention of input error at power-ON and -OFF
1) Power must be applied to the master module either after or simultaneously with the remote I/O units.
2) Power must be turned off to the master module either before or simultaneously with the remote I/O units.

REMARKS

The following power supplies are available for remote I/O stations. For further information, see the following manuals.
- Batch Type Remote I/O Unit User's Manual
- AJ35PTF-128DT Partial Refresh Type Remote I/O Unit User's Manual

1) I/O unit power supply ····· Internally converted to 5V DC and used in the internal circuit of the remote I/O station.
2) Input external supply power ····· Power supply for the input remote I/O unit only.
3) Output external supply power ····· Power supply for the output remote I/O unit only.

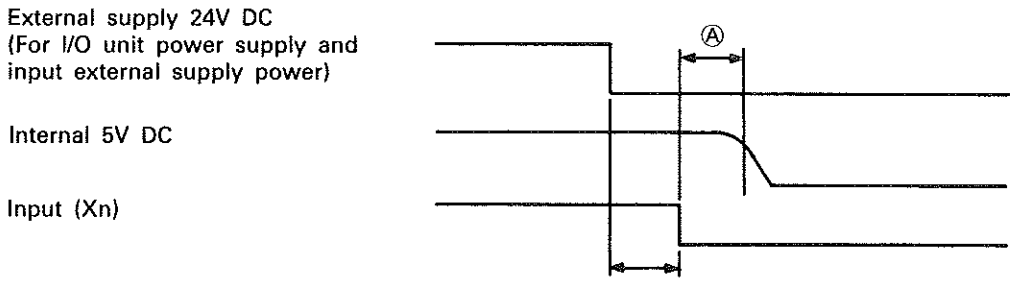
(b) Prevention of input error due to instantaneous power failure of remote I/O station

Input error may be caused by instantaneous power failure occurring at the remote I/O station power supply.

1) Input error caused by instantaneous power failure

The remote I/O hardware uses the I/O unit power supply of 5V DC converted by itself from 24V DC.

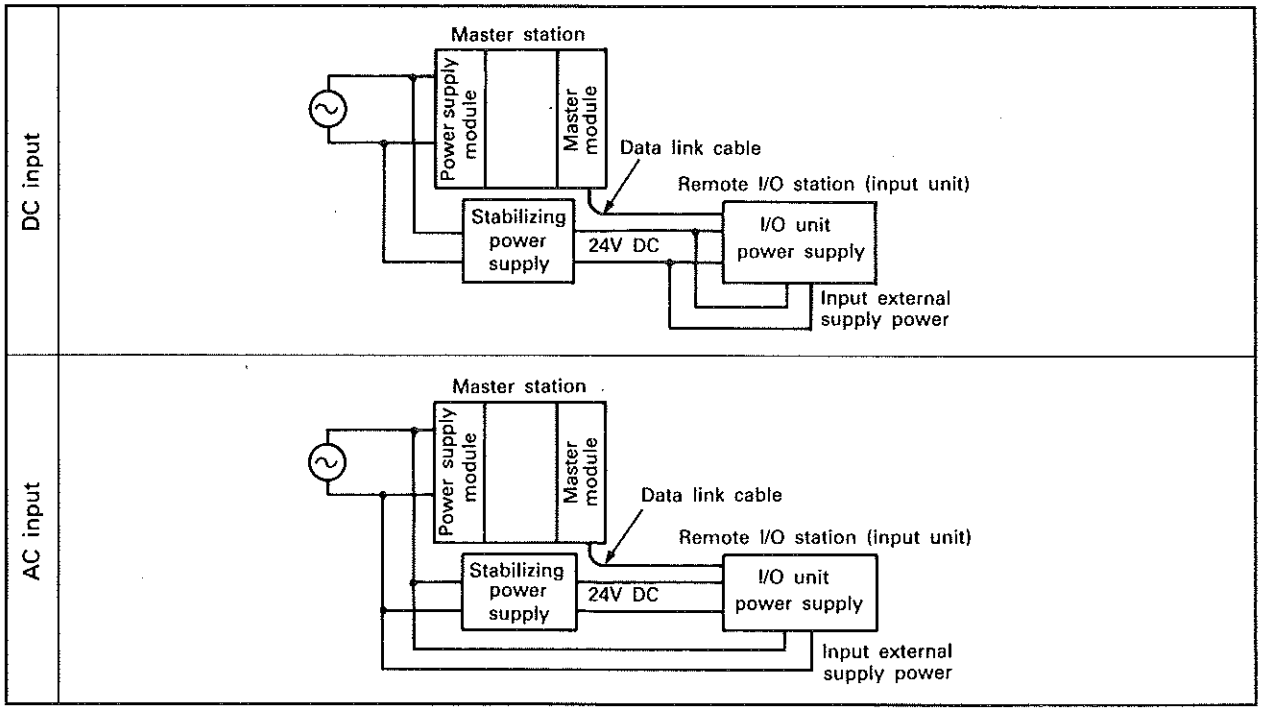
If instantaneous power failure occurs at the remote I/O station, the time elapsed until 5V DC in the remote I/O is switched OFF becomes greater than the input unit switch-OFF response time. Hence, input error occurs if I/O refresh is executed within the period of time indicated by A below.



When the input external supply power is switched OFF, input (Xn) is switched OFF after the input unit switch-OFF response time has elapsed.

2) For prevention of input error

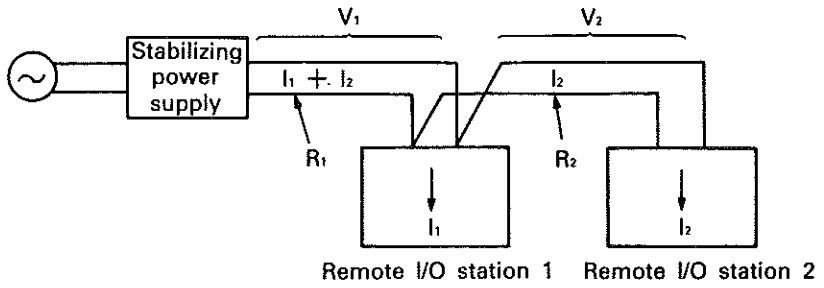
Cables should be wired so that the same power supply provides power to the power supply module, stabilizing power supply, and input external supply power (AC input only).



Power Supply Wiring Example

REMARKS

Voltage drop should be taken into consideration when selecting and routing cables for supplying power from one power supply to several remote I/O units.



V_1 : Voltage drop between stabilizing power supply and remote I/O station 1
V_2 : Voltage drop between remote I/O stations 1 and 2
R_1 : Electrical resistance between stabilizing power supply and remote I/O station 1
R_2 : Electrical resistance between remote I/O stations 1 and 2
I_1 : Current consumed by remote I/O station 1
I_2 : Current consumed by remote I/O station 2

Calculating the voltage drop

$V_1 = R_1 \times (I_1 + I_2)$
$V_2 = R_2 \times I_2$

Calculating the receive terminal voltage of remote I/O station

(Receiving end voltage of remote I/O station 1) =
(stabilizing power supply voltage) $- V_1$
(Receiving end voltage of remote I/O station 2) =
(stabilizing power supply voltage) $- V_1 - V_2$

The remote I/O station may be connected if its receiving end voltage is equal to or greater than its rated voltage.

2.3 Equipment Used with the MINI-S3 Link

The peripheral components shown in Table 2.1 are those used when creating the initial data ROM which is used in the extension mode of the master module, and the message ROM and character generation ROM which are necessary when the operating box is used.

Name	Type	Description	No. of Occupied Stations/ No. of Occupied Stations	Usable Master Module Modes	
				Extension mode	I/O dedicated mode
MELSECNET/ MINI-S3 master module	AJ71PT32-S3	Master module for the MINI-S3 link May be connected with either optical fiber or twisted-pair data links The initial data ROM, which is used during operation in the extension mode, and the message ROM which is required when the operating box is used, are available.	32 points		○
			48 points	○	
Data storage memory	16KROM	Stores initial data when the master module is used in the extension mode. (Installed in master module.)	—	○	—
		Stores message data when the operating box is used. (Installed in the master module.)	—	○	—
		Stores character generation data when the operating box is used. (Installed in the operating box.)	—	○	—
Stand-alone Remote I/O Unit (For optical data link)	AJ35PJ-8A	AC input unit, 100-120V AC, 8 points	1 station	○	○
	AJ35PJ-8D	DC input unit (sink type) 12/24V DC, 8 points			
	AJ35PJ-8R	Contact output unit, 24V DC 2A, 240V AC 2A, 8 points			
	AJ35PJ-8S1	Triac output unit, 100-240V AC, 0.6A/point, 8 points			
	AJ35PJ-8T1	Transistor output unit (sink type), 12/24V DC, 0.1A/point, 8 points			
	AJ35PJ-8T2	Transistor output unit (sink type), 12/24V DC, 0.5A/point, 8 points			
	AJ35PJ-8T3	22Transistor output unit (sink type), 12/24V DC, 2A/point, 8 points			
	AJ35PJ-8S2	Triac output unit, 100-240V AC, 2A/point, 8 points			
Stand-alone Remote I/O Unit (For twisted-pair data link)	AJ35TJ-8A	AC input unit, 100-120V AC, 8 points	1 station	○	○
	AJ35TJ-8D	DC input unit (sink type), 12/24V DC, 8 points			
	AJ35TJ-8R	Contact output unit, 24V DC 2A, 240V AC 2A, 8 points			
	AJ35TJ-8S1	Triac output unit, 100-240V AC, 0.6A/point, 8 points			
	AJ35TJ-8T1	Transistor output unit (sink type), 12/24V DC, 0.1A/point, 8 points			
	AJ35TJ-8T2	Transistor output unit (sink type), 12/24V DC, 0.5A/point, 8 points			
	AJ35TJ-8T3	Transistor output unit (sink type), 12/24V DC, 2A/point, 8 points			
	AJ35TJ-8S2	Triac output unit 100-240V AC, 2A/point, 8 points			
Cable-through fitting	——	For sealing cables into a stand-alone remote I/O station. User prepared.	—	○	○

Table 2.1 Applicable Units, Modules, and Cables (Continue)

Name	Type	Description	No. of Occupied Stations/ No. of Occupied Stations	Usable Master Module Modes	
				Extension mode	I/O dedicated mode
Compact Type Remote I/O unit (for optical data link, twisted-pair data link)	AJ35PTF-32A	AC input unit, 100-120V AC, 32 points	4 stations	○	○
	AJ35PTF-32D	10DC input unit (sink type), 12/24V DC, 32 points			
	AJ35PTF-24R	Contact output unit, 24V DC 2A, 240V AC 2A, 24 points			
	AJ35PTF-24S	Triac output unit, 100-240V AC, 0.6A/point, 24 points			
	AJ35PTF-24T	Transistor output unit, 12/24V DC, 0.5A/point, 24 points			
	AJ35PTF-28AR	I/O unit Input side····· 100-120V AC, 16 points Output side ····· contact output, 24V DC 2A, 240V AC 2A, 12 points			
	AJ35PTF-28AS	I/O unit Input side····· 100-120V AC, 16 points Output side ····· triac output, 100-240V AC, 0.6A/point, 12 points			
	AJ35PTF-28DR	16I/O unit Input side····· sink type, 12/24V DC, 16 points Output side ····· contact output, 24V DC 2A, 240V AC 2A, 12 points			
	AJ35PTF-28DS	I/O unit Input side····· sink type, 12/24V DC, 16 points Output side ····· triac output, 100-240V AC, 0.6A/point, 12 points			
	AJ35PTF-28DT	I/O unit Input side····· sink type, 12/24V DC, 16 points Output side ····· transistor output, sink type, 12/24V DC, 0.5A/point, 12 points			
	AJ35PTF-56AR	I/O unit Input side····· 100-120V AC, 32 points Output side ····· contact output, 24V DC 2A, 24 points	8 stations		
	AJ35PTF-56AS	I/O unit Input side····· 100-120V AC, 32 points Output side ····· triac output, 100-240V AC, 0.6A/point, 24 points			
	AJ35PTF-56DR	I/O unit Input side····· sink type, 12/24V DC, 32 points Output side ····· contact output, 24V DC 2A, 240V AC 2A, 24 points			
	AJ35PTF-56DS	I/O unit Input side····· sink type, 12/24V DC, 32 points Output side ····· triac output, 100-240V AC, 0.6A/point, 24 points			
	AJ35PTF-56DT	I/O unit Input side····· sink type, 12/24V DC, 32 points Output side ····· transistor output, sink type, 12/24V DC, 0.5A/point, 24 points			

Table 2.1 Applicable Units, Modules, and Cables (Continue)

Name	Type	Description	No. of Occupied Stations/ No. of Occupied Stations	Usable Master Module Modes	
				Extension mode	I/O dedicated mode
Data Link Module (for optical data link, twisted-pair data link)	AJ72PT35	Allows the building block type I/O modules to be used as remote I/O units. • Max. number of modules: 8 • I/O points: 128 points • Number of occupied stations: 4, 8, 12, 16 (selected by switch)	See left	○	○
Partial refresh type remote I/O unit (for optical data link, twisted-pair data link)	AJ35PTF-128DT	I/O unit Input side ····· sink type, 12/24V DC, 64 points Output side ····· transistor output, 12/24V DC, 100mA/ point, 64 points	4 stations	○	○
RS-232C interface unit (for optical data link, twisted-pair data link)	AJ35PTF-R2	Interface for external equipment conforming to RS-232C interface specifications 1 RS-232C channel General I/O ····· each 4 points	4 stations	○	—
Mount type operating box (for optical data link, twisted-pair data link)	AJ35PT-OPB-M1	Character display, key input unit Character display ····· 3 lines by 30 columns LCD Sheet keys ····· 8 keys Touch keys ····· 24 keys LED display ····· 8	4 stations	○	—
Portable type operating box (for twisted-pair data link)	AJ35T-OPB-P1				
Joint box (for twisted-pair data link)	AJ35T-JB AJ35T-JBR	Connects the portable type operating box to the MINI-S3 link when necessary.	—	○	—
MELSEC-F series PC connection interface unit	F-16NP (for optical data link)	Interface unit for connecting the MELSEC-F series PC to the MINI-S3 link.	2 stations	○	○
	F-16NT (for twisted-pair data link)				
FR-Z200 series transistorized inverter connection interface board	FR-ZDL	Interface board for connecting the Mitsubishi FR-Z200 series transistorized inverter to the MINI-S3 link.	4 stations	○	○
Twisted-pair shield cable	—	Twisted-pair cable for MINI-S3 link User prepared in accordance with Section 4.4.	—	○	○
Optical fiber cable	—	Optical fiber cable for MINI-S3 link User prepared in accordance with Section 4.3.	—	○	○

Table 2.1 Applicable Units, Modules, and Cables (Continue)

<table>
<tr><th rowspan="2">Name</th><th rowspan="2">Type</th><th rowspan="2">Description</th><th rowspan="2">No. of Occupied Stations/ No. of Occupied Stations</th><th colspan="2">Usable Master Module Modes</th></tr>
<tr><th>Extension mode</th><th>I/O dedicated mode</th></tr>
<tr><td>Optical fiber cable connector</td><td>CA9104AP</td><td>1-core connector for use with the optical fiber cable. Consists of the following:
<table><tr><th>Equipment</th><th>Quantity</th></tr><tr><td>Housing</td><td>1</td></tr><tr><td>Ferrule</td><td>1</td></tr><tr><td>Sleeve</td><td>1</td></tr></table></td><td rowspan="2">The optical fiber cable connector and assembling tool kit are only used with the plastic fiber.</td><td rowspan="2">—</td><td rowspan="2">–</td><td rowspan="2">–</td></tr>
<tr><td>Assembling tool kit</td><td>CT9004P</td><td>For assembling optical fiber cable connectors. Consists of the following:
<table><tr><th>Equipment</th><th>Type</th><th>Quantity</th></tr><tr><td>Fiber stripper</td><td>ST1000</td><td>1</td></tr><tr><td>Fiber cutter</td><td>CV1000</td><td>1</td></tr><tr><td>Fiber clamper</td><td>FC1000</td><td>1</td></tr><tr><td>Replacement blade for cutter</td><td>—</td><td>1</td></tr></table></td></tr>
<tr><td>Optical power tester</td><td>HT-101P</td><td colspan="2">For measuring the luminous energy of the MINI-S3 link.</td><td></td><td></td><td></td></tr>
</table>

Table 2.1 Applicable Units, Modules, and Cables

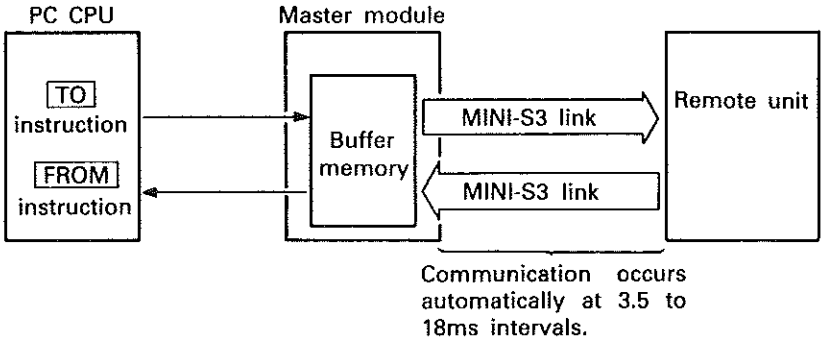
<table>
<tr><th>Name</th><th>Type</th><th>Remarks</th></tr>
<tr><td>System startup disk</td><td>SW□GP-MINIP</td><td>• Creates initial data ROM when the master module is used in the extension mode.
• Creates the message ROM and character generation ROM when the operating box is used.</td></tr>
<tr><td>User disk</td><td>SW0-GPPU</td><td>Contains data used to created by the SW□GP-MINIP type system floppy disk.</td></tr>
<tr><td>Intelligent GPP</td><td>A6GPPE-SET</td><td>• Consists of the following models:
<table>
<tr><th>Type</th><th>Remarks</th></tr>
<tr><td>A6GPP</td><td>• Programming unit with CRT
• Equipped with ROM writer, FDD and printer interface functions</td></tr>
<tr><td>SW□GP-GPPAEE</td><td>A series system disk</td></tr>
<tr><td>SW□GP-GPPKEE</td><td>K series system disk</td></tr>
<tr><td>SW0-GPPU</td><td>User disk (3.5 inch, formatted)</td></tr>
<tr><td>AC30R4</td><td>Cable for connection of CPU and A6GPP 3m/9.84ft length</td></tr>
</table></td></tr>
<tr><td>Plasma handy programmer</td><td>A6PHPE-SET</td><td>• Consists of the following models:
<table>
<tr><th>Type</th><th>Remarks</th></tr>
<tr><td>A6GPP</td><td>• Programming unit with LCD
• Equipped with FDD, printer interface and memory card interface functions</td></tr>
<tr><td>SW□GP-GPPAEE</td><td>A series system disk</td></tr>
<tr><td>SW□GP-GPPKEE</td><td>K series system disk</td></tr>
<tr><td>SW0-GPPU</td><td>User disk (3.5 inch, formatted)</td></tr>
<tr><td>AC30R4</td><td>Cable for connection of CPU and A6PHP 3m/9.84ft length</td></tr>
</table></td></tr>
<tr><td>P-ROM writer</td><td>A6WU</td><td>Writes initial, canvas, and character generation data to ROM. Reads data written in ROM using the A6PHP.</td></tr>
<tr><td>RS-422 cable</td><td>AC03WU</td><td>Cable for connection of A6PHP and A6WU. 0.3m/0.98ft length</td></tr>
<tr><td rowspan="2">Printer</td><td>K6PR</td><td rowspan="2">For printing initial, message, and character generation data</td></tr>
<tr><td>K7PR</td></tr>
<tr><td>Printer paper</td><td>K6PR-Y</td><td>Printer paper for the K6PR</td></tr>
<tr><td rowspan="3">Ink ribbon</td><td>K6PR-R</td><td>Ink ribbon for the K6PR</td></tr>
<tr><td>K7PR-R</td><td>Ink ribbon for the K7PR</td></tr>
<tr><td>A7PR-R</td><td>Ink ribbon for the K7PR</td></tr>
<tr><td>RS-232C cable</td><td>AC30R2</td><td>Cable for connection of A6GPP and A6PHP. 3m/9.84ft length</td></tr>
</table>

Table 2.2 Peripheral Equipment List

3. LINK PROCESSING

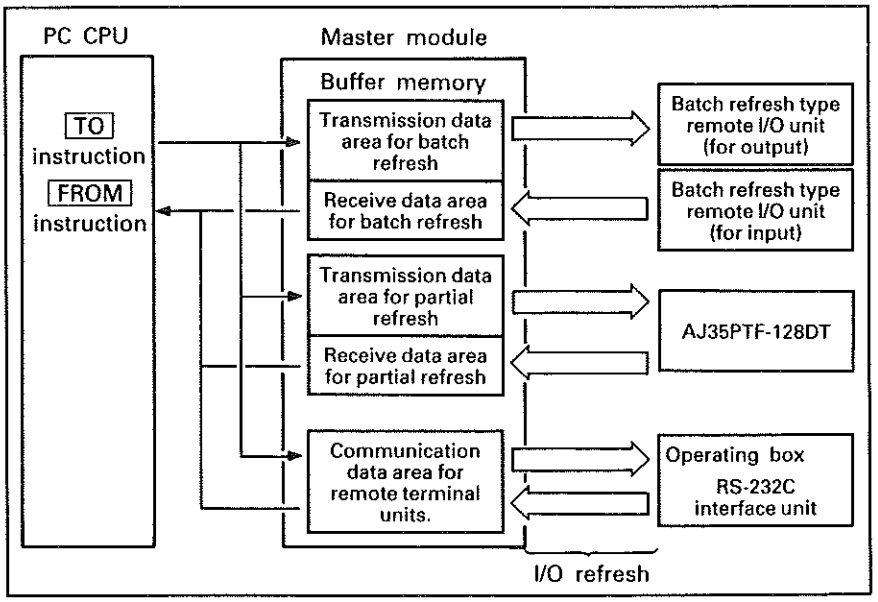
3.1 Link Processing

The following sections describe the method of communication for the MINI-S3 link.
MINI-S3 link communication processing occurs automatically between the buffer memory of the master module and each of the remote units at 3.5 to 18ms intervals regardless of the sequence program scan.



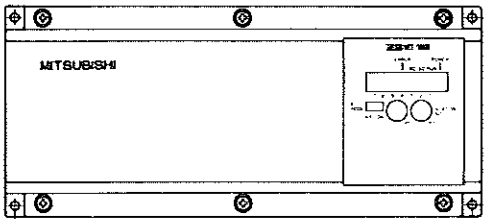
Data transmission between the PC CPU and each of the remote units is conducted by writing the transmitted data in the buffer memory of the master module, upon which it is automatically transmitted to each of the remote units upon I/O refresh.
Data is written to the master unit buffer memory using the TO instruction of the sequence program.
The data received from each of the remote units is automatically written to the buffer memory of the master module upon I/O refresh.
The data received in the master module is read by the PC CPU using the FROM instruction of the sequence program.

The buffer memory of the master module contains a communication data area as indicated below. The storage area for the transmit data varies depending on the remote unit with which communication is being conducted.

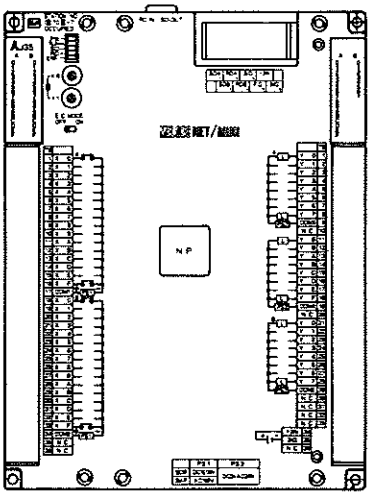


3.2 Communication Processing for the Batch Refresh Type Remote I/O Unit

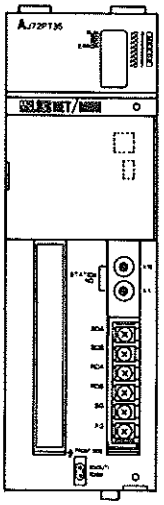
All I/O points in batch refresh type remote I/O units are processed in one I/O refresh. Three types of batch refresh type remote I/O unit are provided for the MELSEC-A series.



Stand-alone remote I/O unit
(AJ35□J-8□)



Compact remote I/O unit
(AJ35PTF-□□□□□)



Data link unit
(AJ72PT35)

Stand-alone remote I/O unit

(a) Has high-strength, drip-proof casing made of aluminum diecast to allow direct installation to machinery for use as a cable junction box.
(b) The protection structure conforms to IP 54F (JEM1030).
(c) One unit allows 8-point inputs or outputs.
(d) Occupies 1 station.
(e) Optical and twisted-pair data link modules are available.

Compact remote I/O unit

(a) Has the same dimensions as the compact type (A0J2) I/O units.
(b) Units available are 32-point dedicated input, 24-point dedicated output, and 28-point (16-point input, 12-point output) and 56-point (32-point input, 24-point output) compound I/O units.
(c) Occupies 4 or 8 stations in accordance with the number of I/O points as indicated. For more information, see the specifications of the corresponding units in Section 3.
    4 stations ····· Unit with 32, 24 or 28 I/O points
    8 stations ····· Unit with 56 I/O points
(d) Can be used for both optical and twisted-pair data links. For example, data may be received through optical data link (cable connected to RD) and transmitted through twisted-pair data link (cable connected to SDA and SDB)

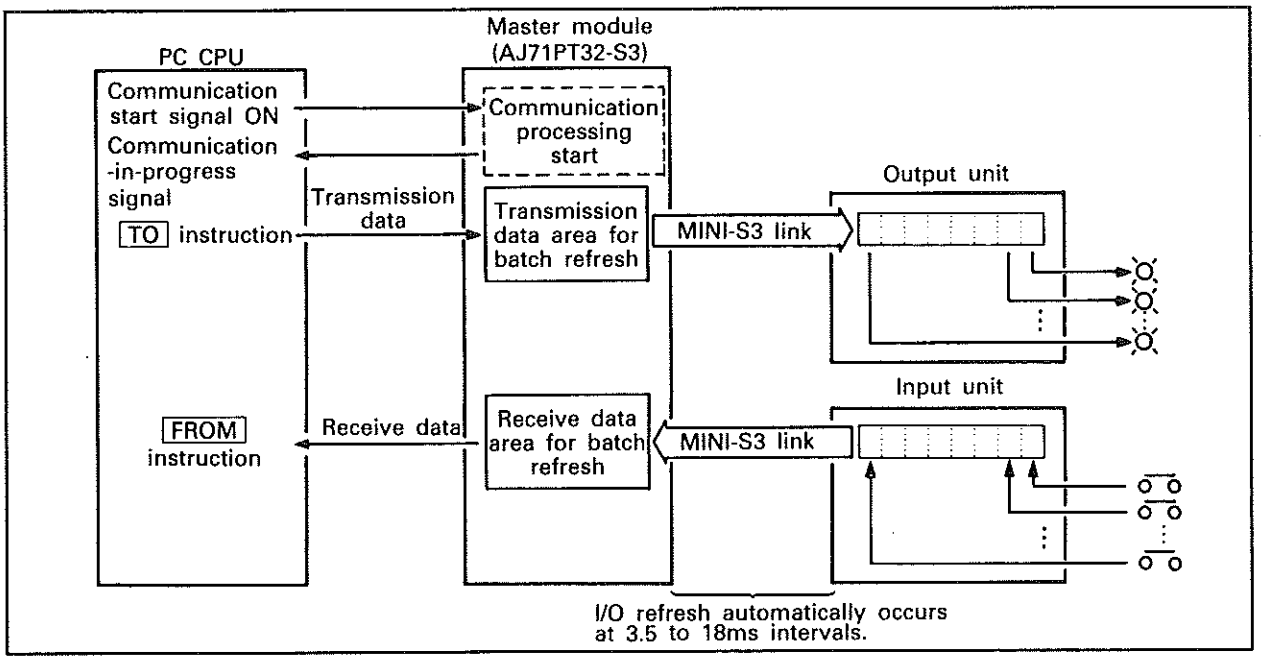
AJ72PT35 data link module

(a) Loaded on the CPU slot of the main base unit to allow the A series building block type I/O modules to be used on a remote I/O station.
(b) One module allows use of up to 128 I/O points.
(c) Allows the number of stations occupied to be specified between 4 and 16 in increments of 4.
(d) Can be used for both optical and twisted-pair data links. For example, data may be received through optical data link (cable connected to RD) and transmitted through twisted-pair data link (cable connected to SDA and SDB).

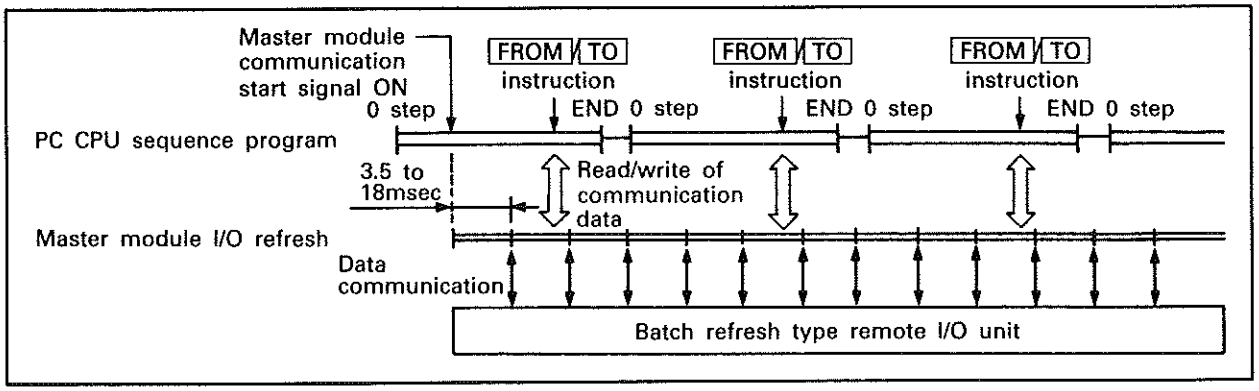
REMARKS

For further information concerning communication processing, the specifications, handling, and programming for the AJ35PTF-128DT batch refresh type remote I/O unit, refer to the Batch Refresh Type Remote I/O Unit User's Manual.

(1) Data output and input to and from batch refresh type remote I/O units begin when the master module communication start signal is set to on. I/O refresh automatically occurs at 3.5 to 18ms intervals regardless of the sequence program scan.

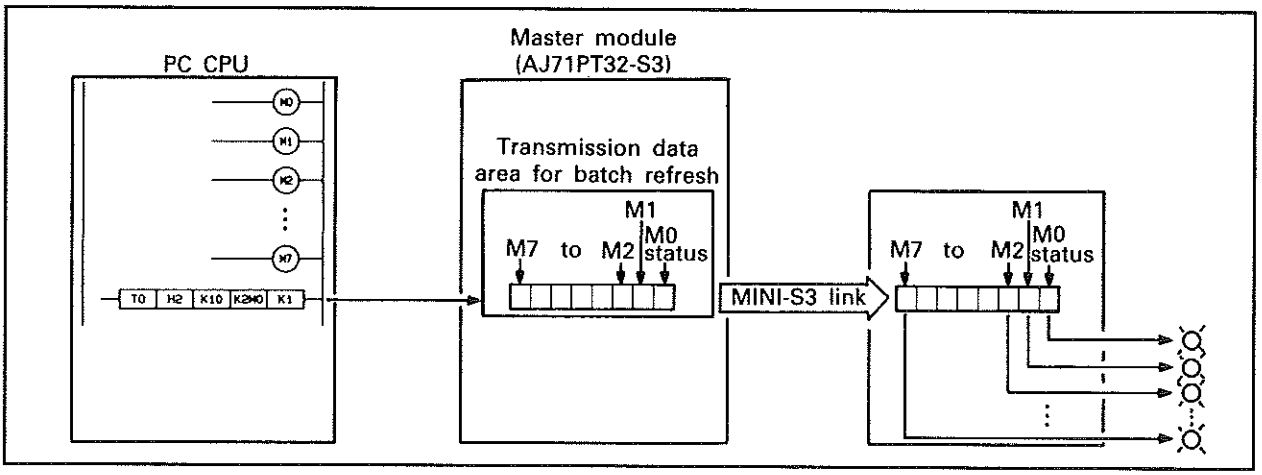


(2) Data communication timing is indicated below.



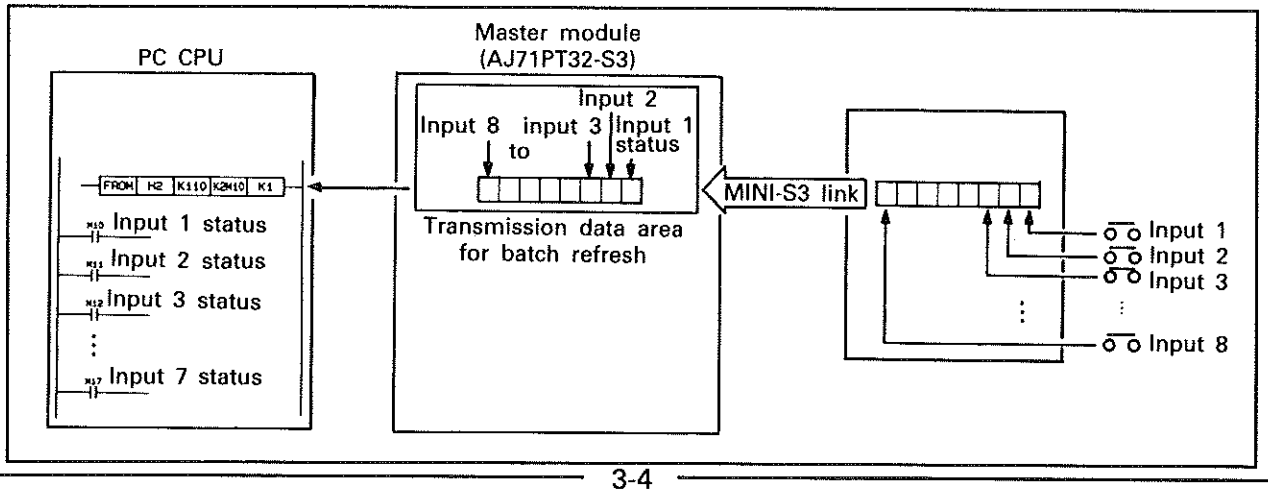
3.2.1 Output to batch refresh type remote I/O unit

When data is output to the remote I/O unit, the data is written to the transmission data area in the master module using the sequence program TO instruction.
Writing data to the transmission data area results in its being transmitted automatically to the remote I/O unit and output to external device.
Each output of the remote I/O unit corresponds to a particular bit in the master module transmission data area. When an output is set to ON, "1" is written to the transmission data area bit corresponding to that output. When an output is set to OFF, "0" is written to the transmission data area bit corresponding to that output.



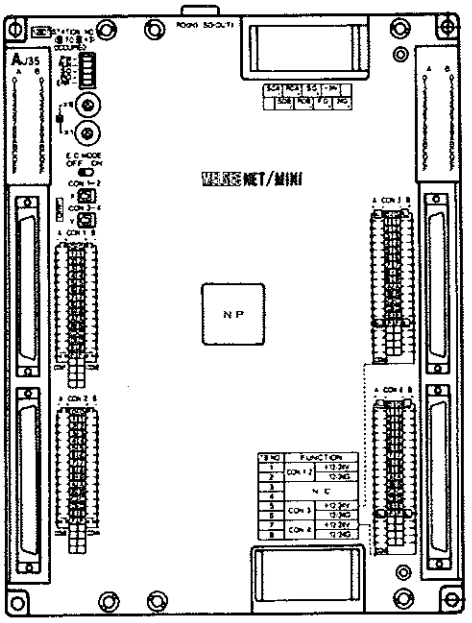
3.2.2 Input from batch refresh type remote I/O unit

When input data from the remote I/O station is read, the data is read from the receive data area of the master module upon execution of the sequence program FROM instruction.
When data is input from an external device to the remote I/O unit, the input data is automatically received in the receive data area of the master module.
Each input of the remote I/O unit corresponds to a particular bit in the master module receive data area.
When an input is set to ON, "1" is written to the receive data area bit corresponding to that input. When an input is set to OFF, "0" is written to the receive data area bit corresponding to that input.



3.3 Communication Processing for the Partial Refresh Type Remote I/O Unit

The I/O points in partial refresh type remote I/O units are allocated for processing over a series of I/O refreshes, allowing a few occupied stations to control many I/O points.



AJ35PTF-128DT

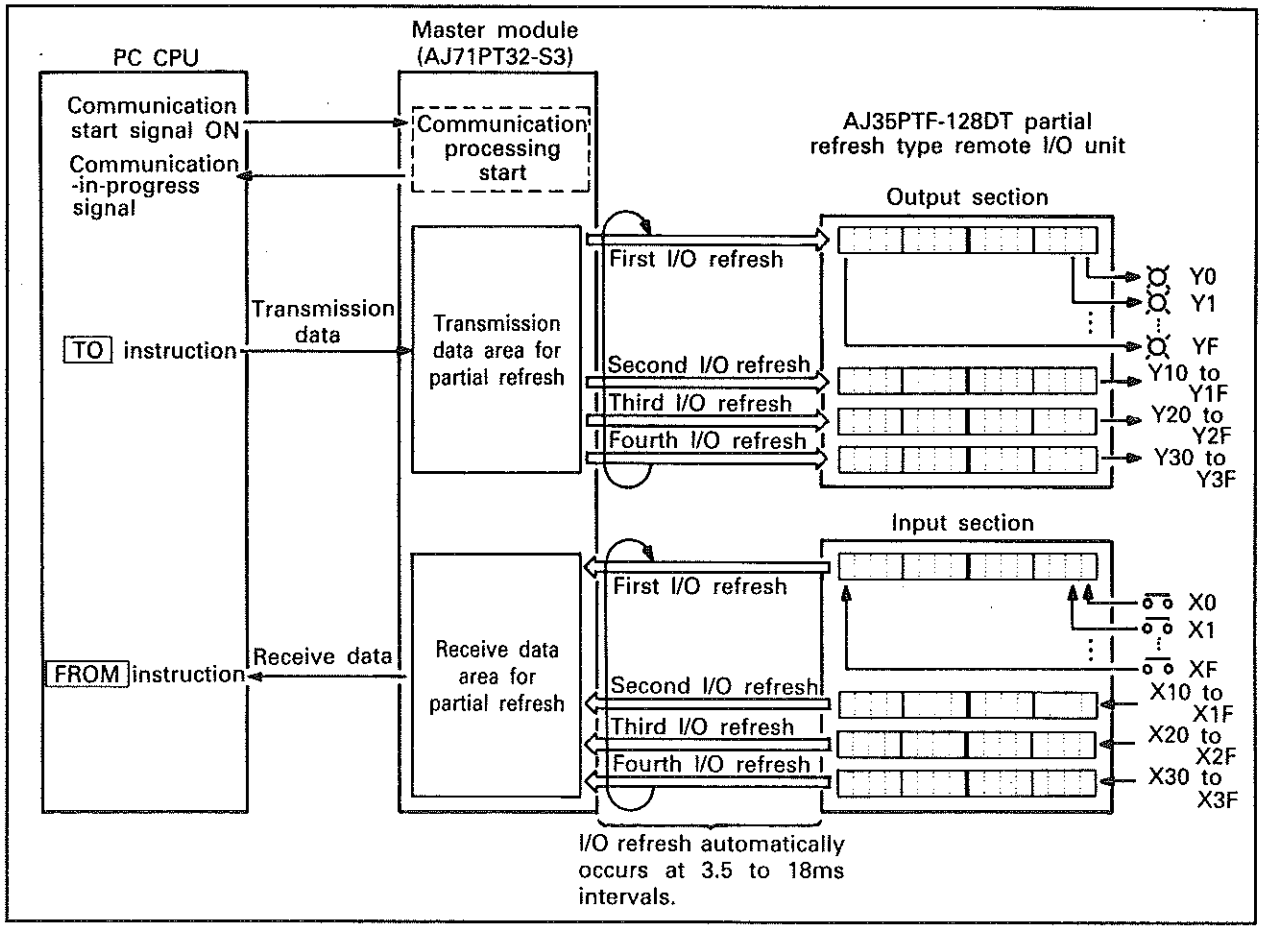
AJ35PTF-128DT

(a) The measurements for the AJ35PTF-128DT are the same as the compact type remote I/O unit (AOJ2-E56[ ][ ]).
(b) The AJ35PTF-128DT can process 64 DC inputs and 64 transistor outputs.
(c) The number of occupied station are 4.
(d) The AJ35PTF-128DT can be used in either an optical fiber or twisted-pair data link.
Data may be received through optical data link (cable connected to RD) and transmitted through twisted-pair data link (cable connected to SDA and SDB).

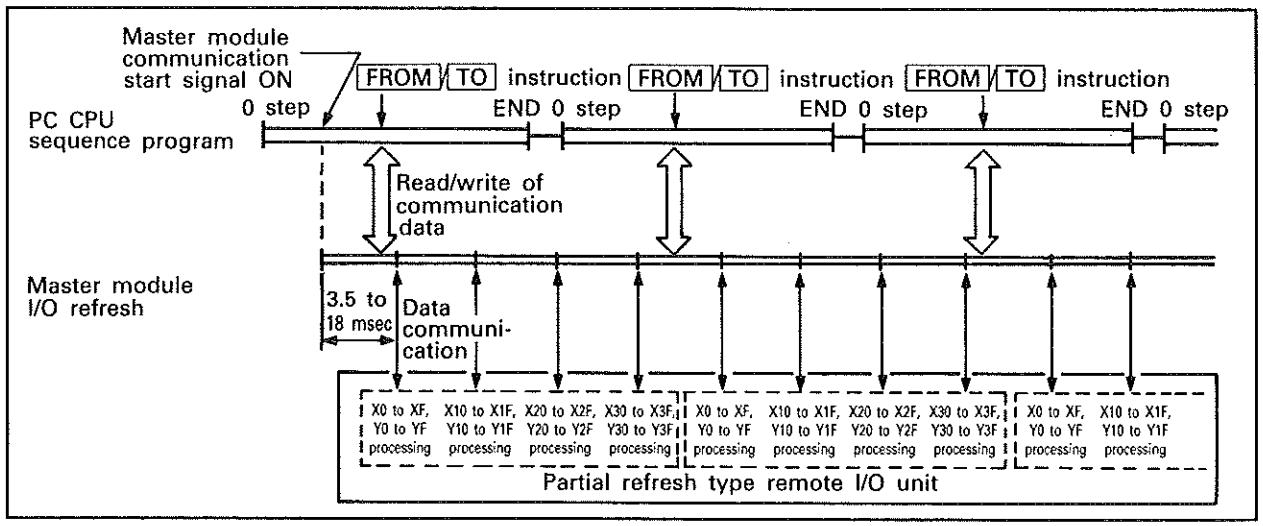
REMARKS

For further information concerning communication processing, the specifications, handling, and programming for the AJ35PTF-128DT partial refresh type remote I/O unit, refer to the Partial Refresh Type Remote I/O Unit User's Manual.

(1) Data output and input to and from the AJ35PTF-128DT partial refresh type remote I/O units begin when the master module communication start signal is set to ON.
The data output and input to and from the AJ35PTF-128DT is allocated to the I/O points of the AJ35PTF-128DT and processed over four I/O refresh cycles.
16 input points and 16 output points are processed during one I/O refresh cycle.

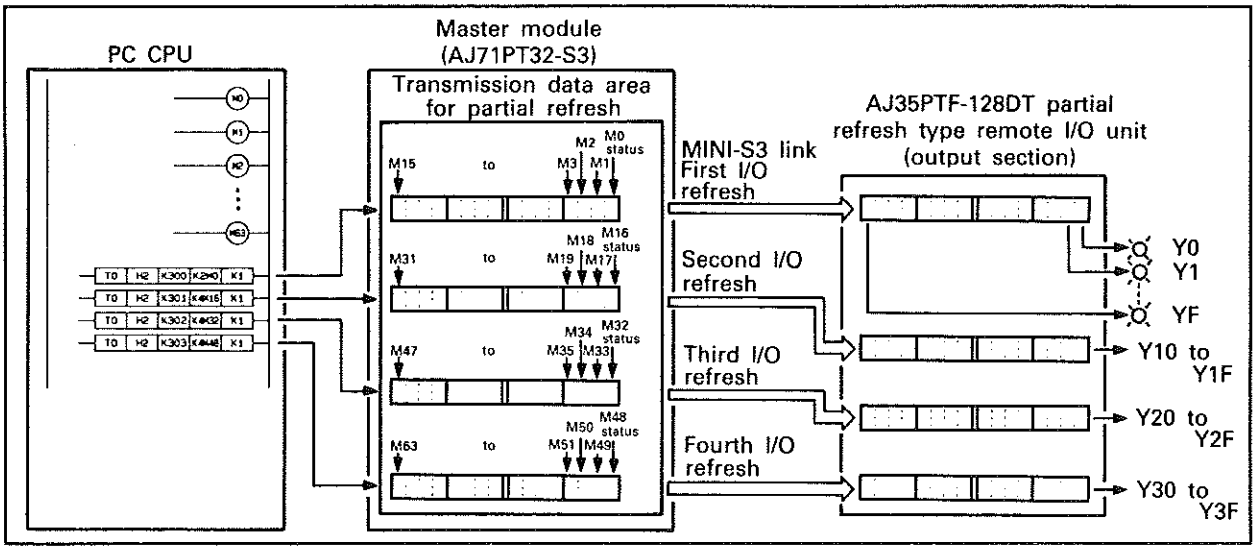


(2) Data communication timing is indicated below.



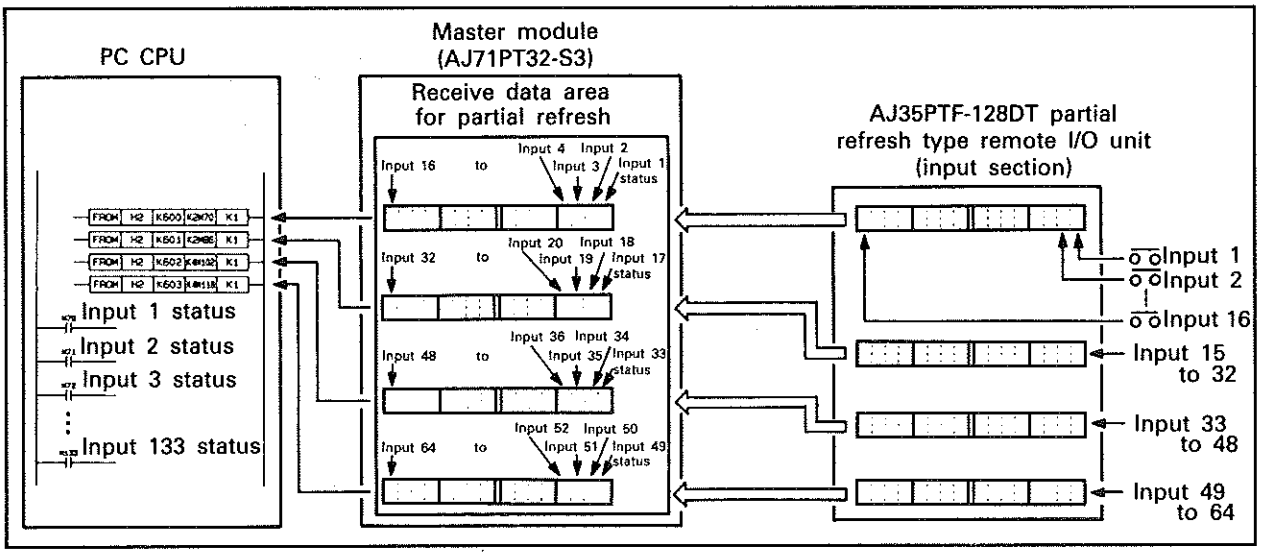
3.3.1 Output to the partial refresh type remote I/O unit

When data is output to the remote I/O unit, the data is written to the transmission data area of the master module using the sequence program [TO] instruction.
Writing data to the transmission data area results in its being transmitted automatically in 64 output point allocations during four I/O refresh cycles to the remote I/O unit and output to external device.
Each output of the remote I/O unit corresponds to a particular bit in the master module transmission data area.
When an output is set to ON, "1" is written to the transmission data area bit corresponding to that output. When an output is set to OFF, "0" is written to the transmission data area bit corresponding to that output.



3.3.2 Input from the partial refresh type remote I/O unit

When input data from the remote I/O station is read, the data is read from the receive data area of the master module upon execution of the sequence program FROM instruction.
When data is input from an external device to the remote I/O unit, the input data is automatically received in the receive data area of the master module.
Receive processing occurs in 64 input point allocations during four I/O refresh cycles.
Each input of the remote I/O unit corresponds to a particular bit in the master module receive data area.
When an input is set to ON, "1" is written to the receive data area bit corresponding to that input. When an input is set to OFF, "0" is written to the receive data area bit corresponding to that input.



3.4 Communication Processing for the Operation Box

The operating box is a remote terminal unit that provides an LCD (Liquid Crystal Display) and operation keys for character display, as well as key input. It can be connected directly to the MELSECNET/MINI-S3 link.

REMARKS

For further information concerning communication processing, the specifications, handling, and programming for the operating box, refer to the M1/AJ35PT-OPB-M1/AJ35PT-OPB-P1 Operating Box User's Manual.

(1) The operating box is configured as indicated in Fig. A.

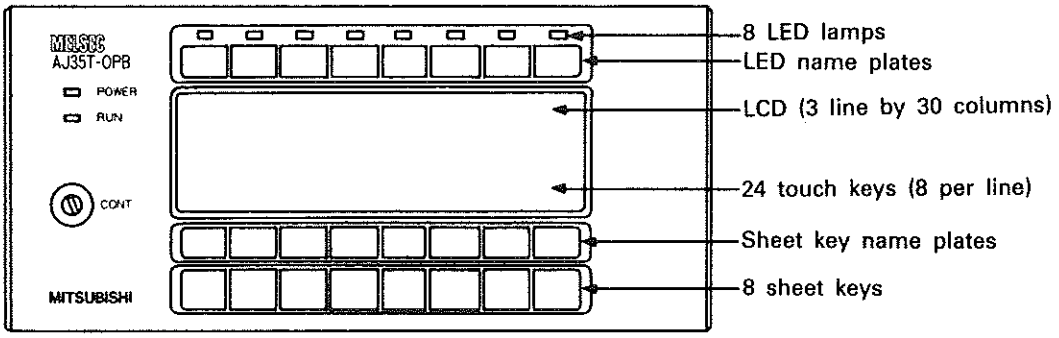
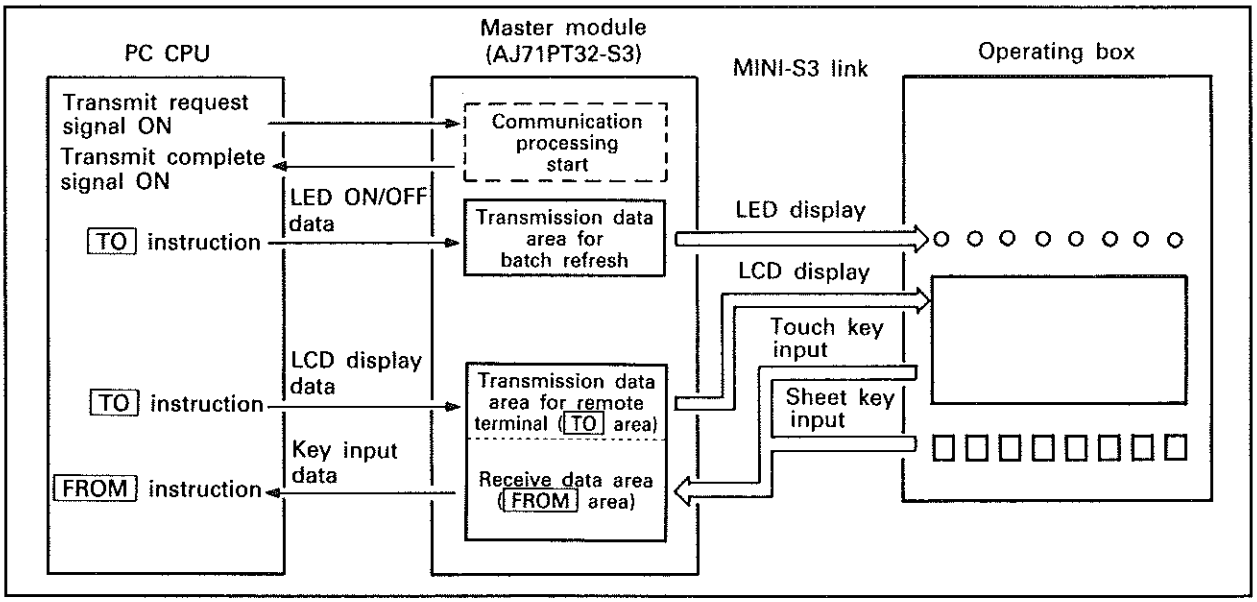


Fig. A

(2) The following operations can be conducted with the operating box.
- Character display using the LCD
- Input using the touch keys and sheet keys
- Display of ON/OFF data using the LEDs



3.4.1 The LCD and data display

(1) The following characters can be displayed on the LCD.
- Alphanumeric and special characters
- User designated characters

(2) The types of information that can be displayed on the LCD are indicated below.
- Display of fixed messages stored in the message ROM
- Display of defined characters set by the character code
- Display of device comment
- Display of numerical data
- Display in percentage of numerical data used in bar graphs

(3) The following display methods are provided

(a) Creation of messages for the message ROM

Messages stored in the message ROM are made using the SW□GP-MINIP type system floppy disk. The message ROM is installed in the master module.

Data set in the message ROM are the fixed message No., the fixed message (up to 30 characters in length), and the display mode.

The display mode is first set to specify what is to be displayed. The types of fixed messages displayed in which mode are those indicated below.

Display mode 1: Fixed messages only

Example) A line start

Display mode 2: Fixed message + defined character

Example) □□□□□□□□□□ Running

A character determined by the sequence program is displayed.

Display mode 3: Fixed message + device comment

Example) X0 (□□□□□□□□□□) was turned on.

A comment created by the SW□GP-MINIP type system floppy disk is displayed.

Display mode 4: Fixed message + numerical data

Example) Production record Machinery A □□□ Machinery B □□□

Numerical values set by the BCD are displayed.

Display mode 5: Fixed message + bar graph data

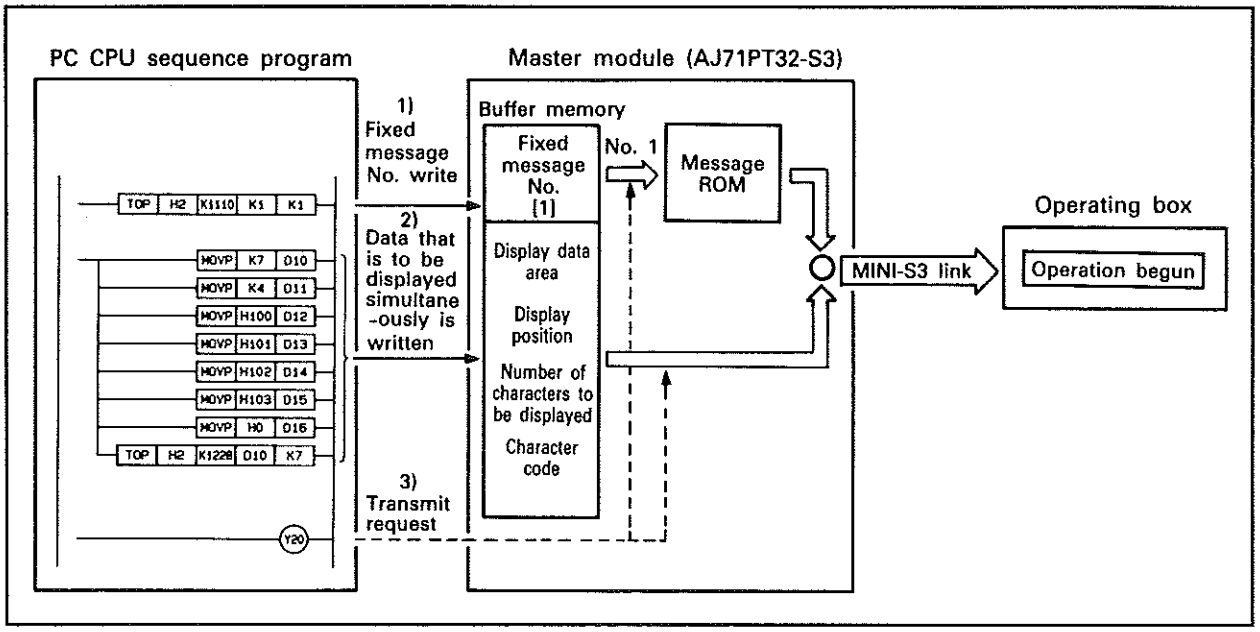
Example) Goal achievement ▨▨▨▨▨▨▨▨□□□□□□□□ 40%

The graph is automatically shown using the values set from 0 to 100.

Up to 400 fixed messages can be recorded.

(b) Display procedure

The messages are displayed when the TO instruction of the sequence program simultaneously writes to the buffer memory the display fixed message No. and the data to be displayed and the transmit request signal is set to ON.

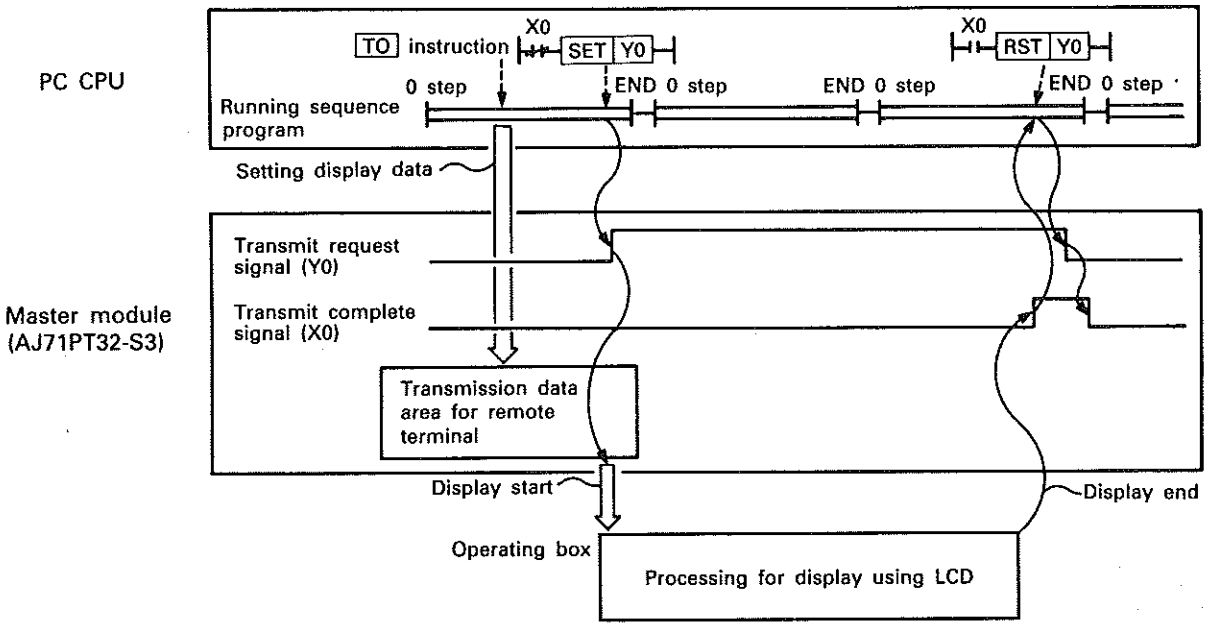


1) The fixed message corresponding to the fixed message No. of the message that is to be displayed is written from the message ROM to the buffer memory.

2) The data that is to be displayed simultaneously with the fixed message is set in the display data area of the buffer memory.

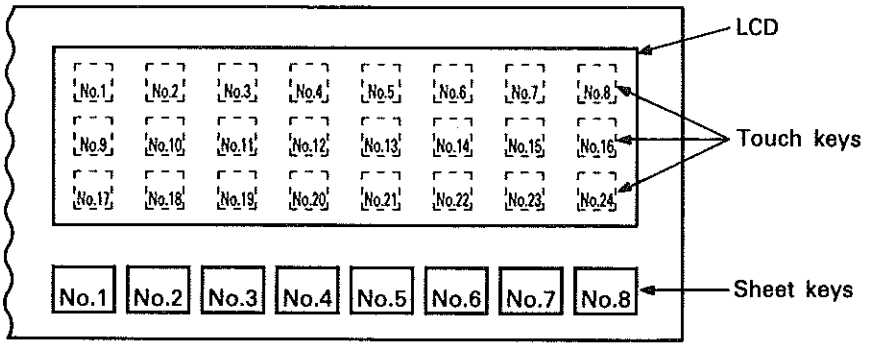
3) When the transmit request signal is set to ON by the sequence program, the fixed message corresponding to the fixed message No. is read from the message ROM.
The display data that is appropriate for the fixed message set by the display mode and that is to be displayed simultaneously with it, is read from the display data area.
After the fixed message and the data that is to be displayed simultaneously are read, the fixed message and display data are transmitted to the operating box.
The transmission of the display data to the operating box is done over a series of I/O refresh cycles.

(c) The display timing for the LCD is indicated below.

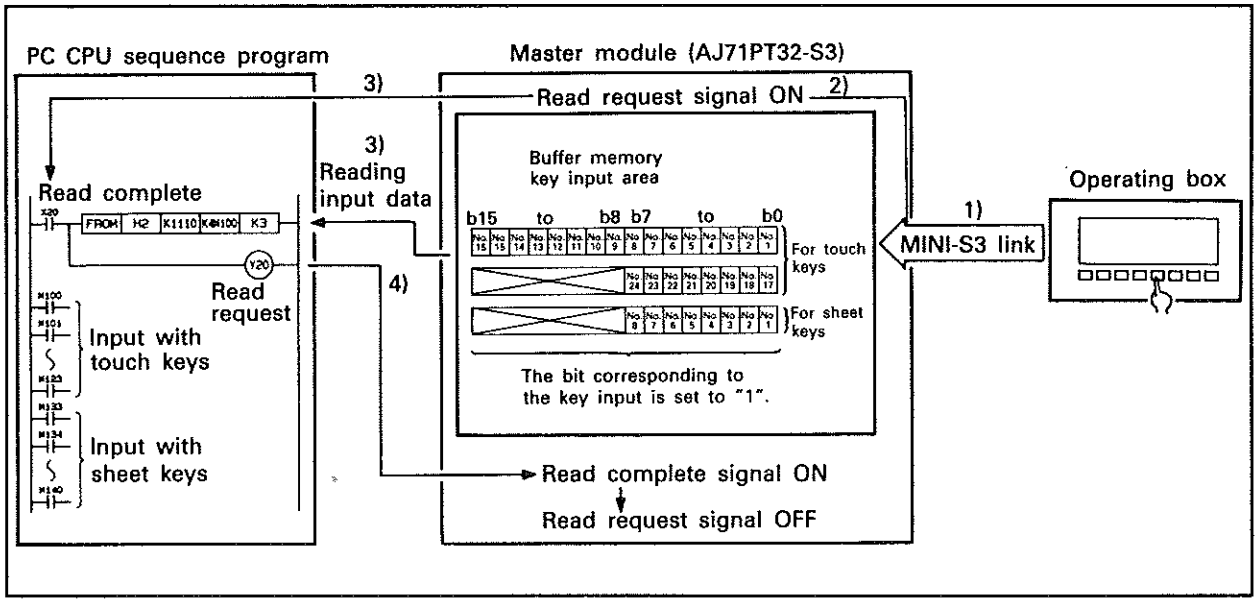


3.4.2 Input using the touch keys and sheet keys

(1) The touch keys and sheet keys are arranged in lines as indicated below. The key input data is written to the key input area in the buffer memory of the master module.

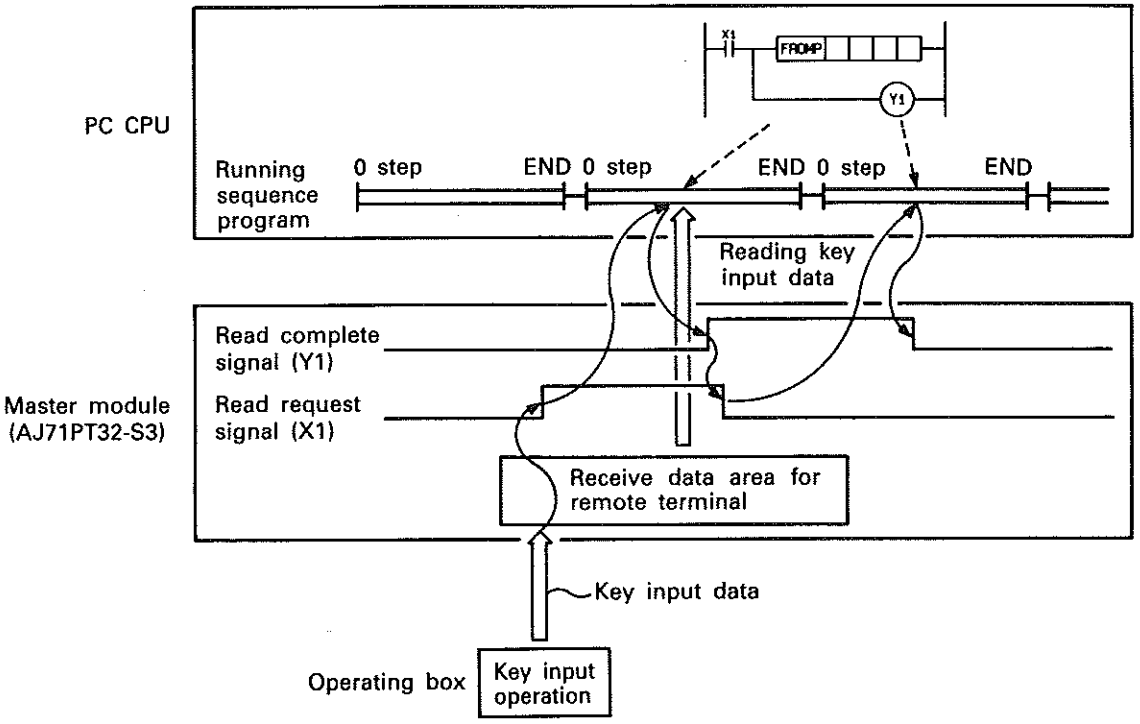


(2) Each bit of the key input area corresponds to a particular key and is set to "1" when the corresponding key is input.



1) When a key of the operating box is pressed, the data of the input key is automatically transmitted to the master module.
2) When the master module receives the data of the input key, the bit of the key input area corresponding to the input key is set to "1" and the read request signal is set to ON.
3) When the on status of the read request signal is detected, the data contained in the key input area is read using the FROM instruction of the sequence program.
4) When the data in the key input area has been read using the FROM instruction, the read complete signal is set to ON by the sequence program.
   The master module automatically clears the key input area of all data when the read complete signal is set to ON and then sets the read request signal OFF.
   Setting the read request signal to OFF enables the next key data to be input.
   (Key data cannot be input while the read request signal is ON. Neither is it possible to press more than one key simultaneously.)

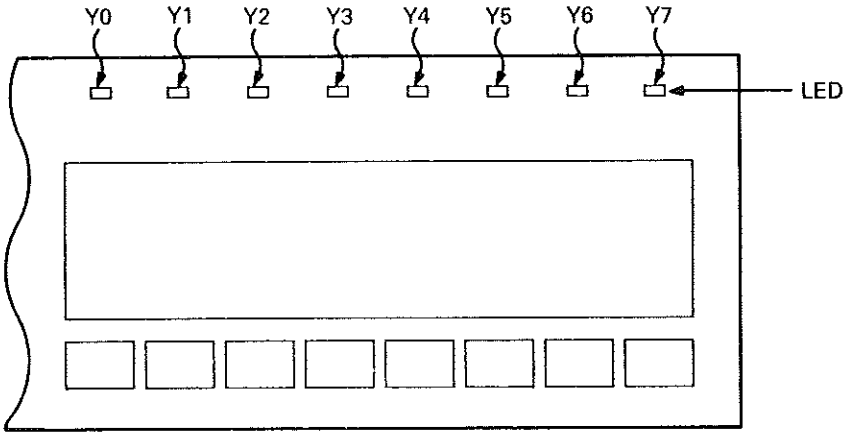
(3) Key input data receive timing is indicated below.



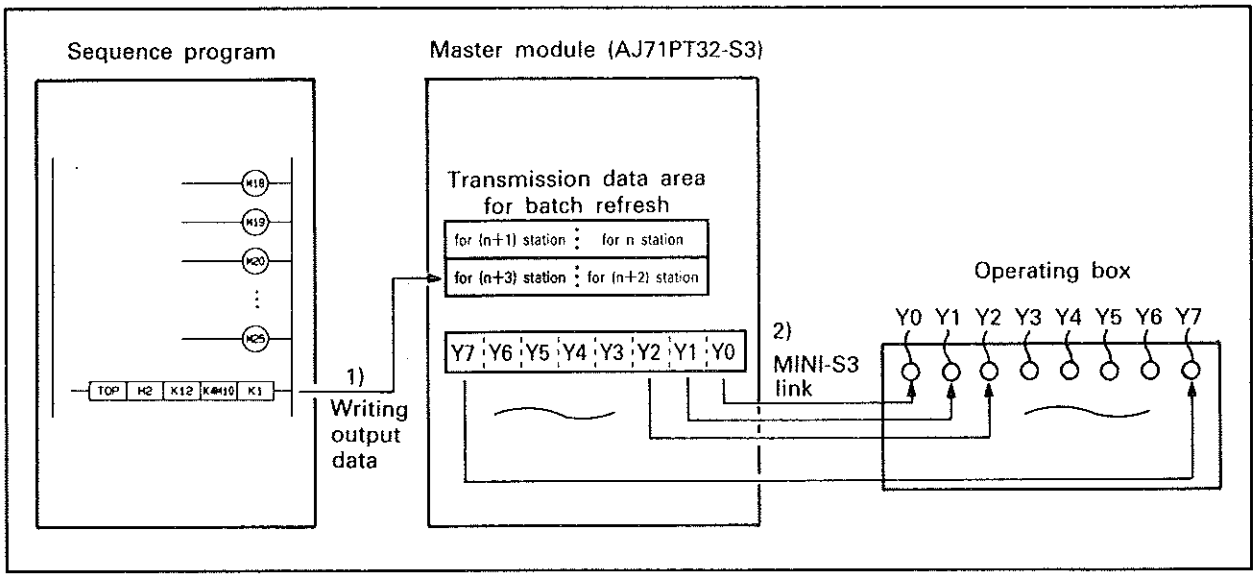
3.4.3 Output to the LEDs

(1) Output to the operating box LEDs is done in the same manner as data transmission to the batch refresh type remote I/O units.

(2) The operating box LEDs are assigned numbers as indicated below. The data output to each LED is written to the transmission data area for batch refresh.



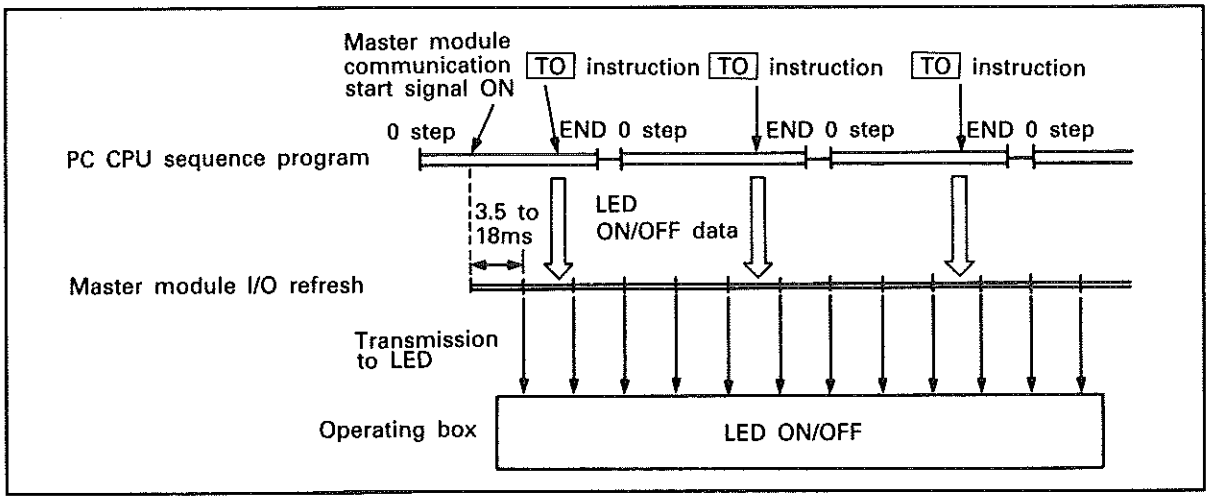
(3) Each LED corresponds to each bit of the transmission data area for batch refresh which corresponds to the last station number of the station number assigned the operating box. When "1" is written to a bit, the corresponding LED is turned ON. When a "0" is written to a bit, the corresponding LED is turned OFF.



1) ON/OFF data is written to the transmission data area for batch refresh of the master module using the TO instruction of the sequence program.

2) The ON/OFF data written to the transmission data area for batch refresh of the master module is automatically transmitted to the operating box and the LED turned ON or OFF as appropriate.

(4) The LED ON/OFF timing is indicated below.



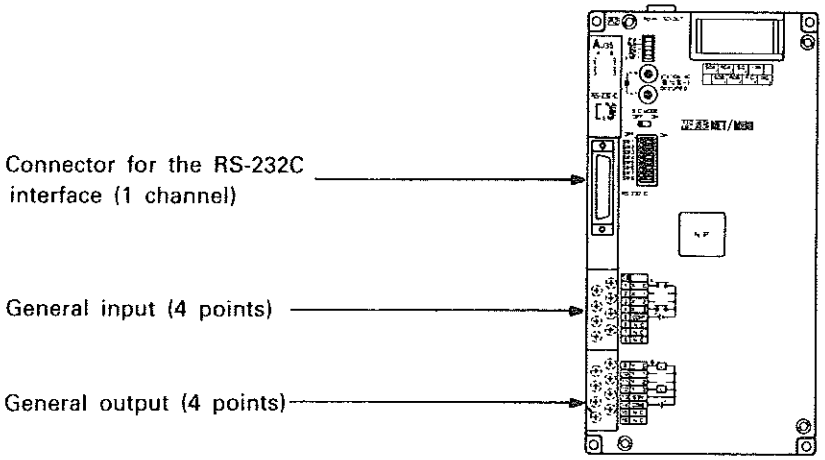
3.5 Communication Using the RS-232C Interface Unit

The RS-232C interface unit provides one channel of RS-232C interface that may be used to receive data from bar-code readers, ID card controllers, or for communication with external device such as personal computers and printers in the no-protocol mode.

REMARKS

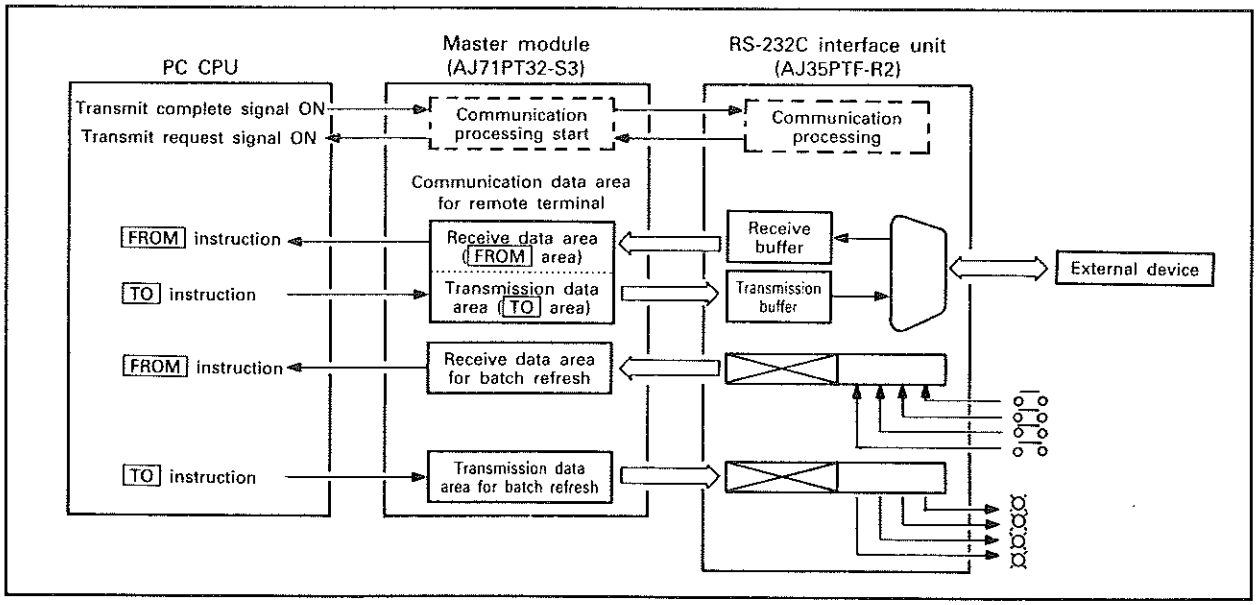
For further information concerning the specifications, handling, and programming for communication processing using the RS-232C interface unit, refer to the AJ35PTF-R2 RS-232C interface unit User's Manual.

(1) The RS-232C interface unit configuration is indicated below.



(2) The functions usable with the RS-232C interface unit are indicated below.
- Input data from a bar-code reader using special protocol
- Input data from an ID card controller using special protocol
- Communication with external device conforming to RS-232C specifications using no-protocol.

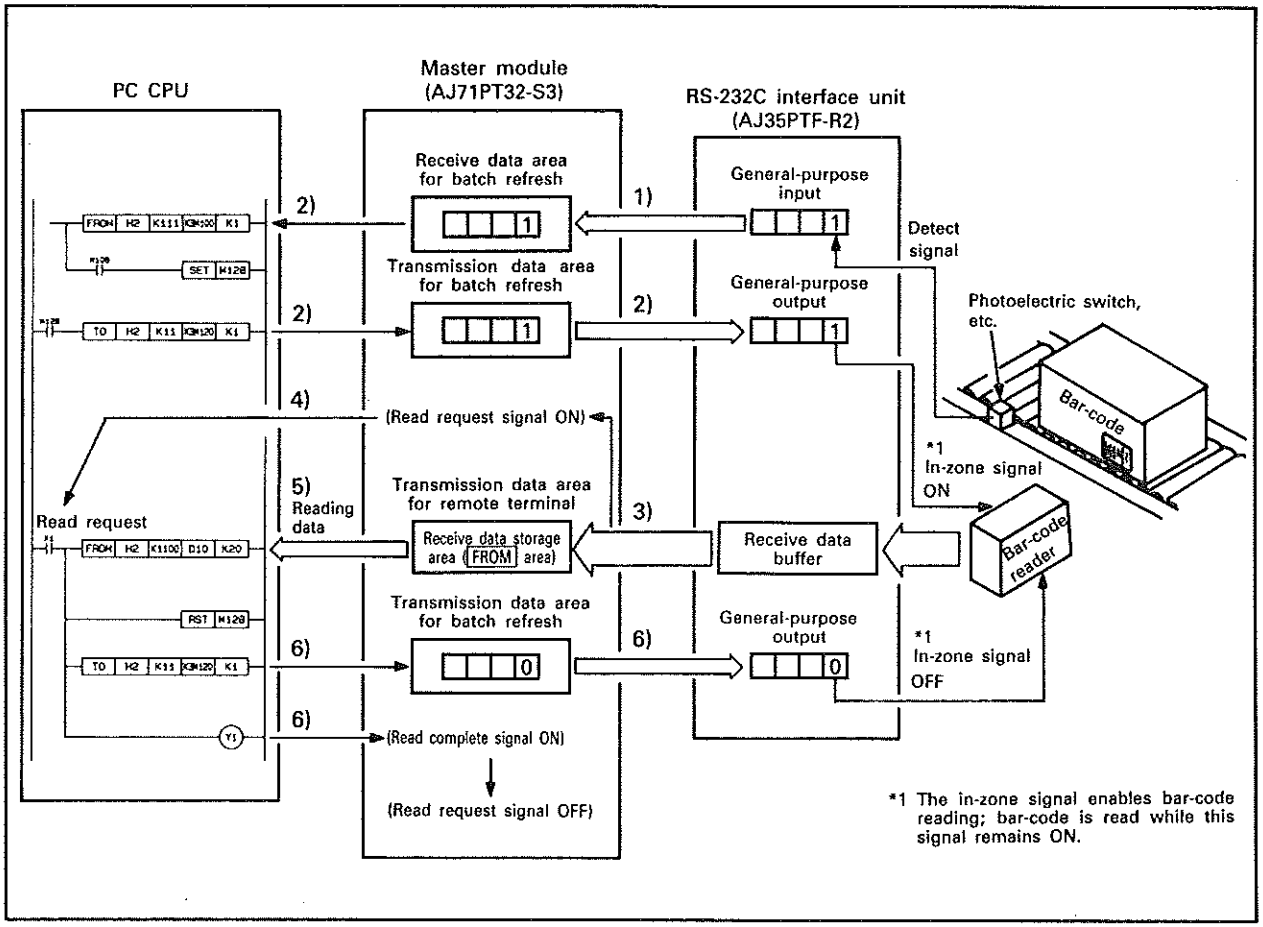
The SW□GP-MINIP type system floppy disk is used to set in the initial data ROM which function the RS-232C interface unit is to be used for.



3.5.1 Input data from a bar-code reader

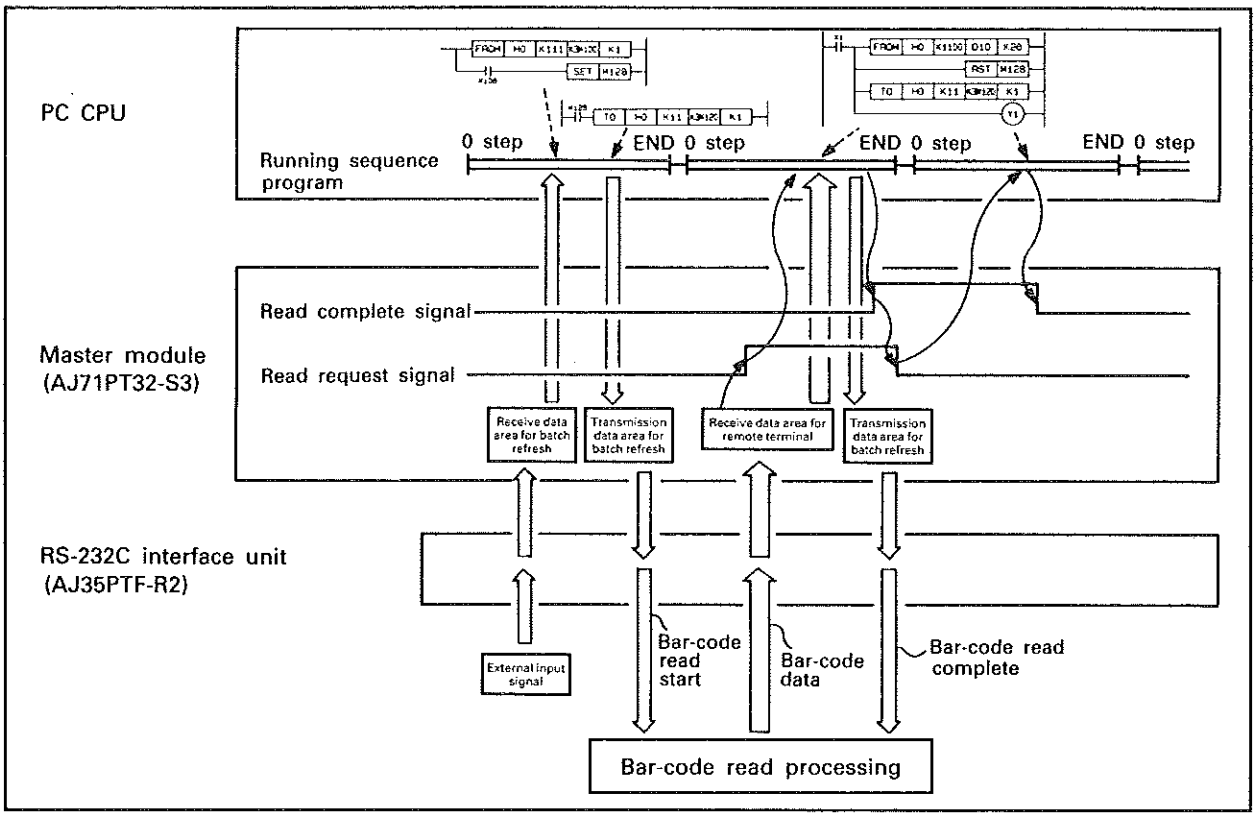
Data is input from a bar-code reader using the RS-232C interface unit with the special protocol indicated below.
The special protocol is a special, predetermined communication procedure used to control communication.
The special protocol enables the user to input data using a simple program by providing automatic processing of the control codes used in communication

(1) The following section describes the procedure for data input. For data input using a bar-code reader, data read timing is controlled by using general-purpose I/Os as object detecting signal and bar-code reader's read command.



1) The photoelectric switch detects whether the bar-code label has been placed within the reading area of the bar-code reader and transmits the data as general-purpose input. General-purpose input data is automatically stored in the receive data area for the batch refresh type remote I/O unit using the I/O refresh of the master module.
2) When it is detected that the object to be read is set in place, the in-zone signal is set to ON ,for the bar-code reader by the sequence program.
   The in-zone signal is transmitted via the general-purpose output.
   The general-purpose output is written to the transmission data area for batch refresh by the sequence program. The written data is automatically transmitted to the RS-232C interface unit by the I/O refresh of the master module and output to an external device.
   The bar-code reader begins reading when the in-zone signal is set to ON.
3) The data read by the bar-code reader is transmitted automatically to the receive data area of the master module over a series of I/O refresh cycles.
4) When the data read by the bar-code reader is received in the master module, the read complete signal is set to ON in relation to the PC CPU.
5) When the on status of the read request signal is detected, the data contained in the master module is read using the FROM instruction of the sequence program.
6) When the data read processing is completed, the sequence program sets the read complete signal to ON.
   The master module automatically sets the read request signal to OFF when the read complete signal is set to ON. Setting the read request signal to OFF enables the next data to be input.
   (Data cannot be input while the read request signal is ON.)

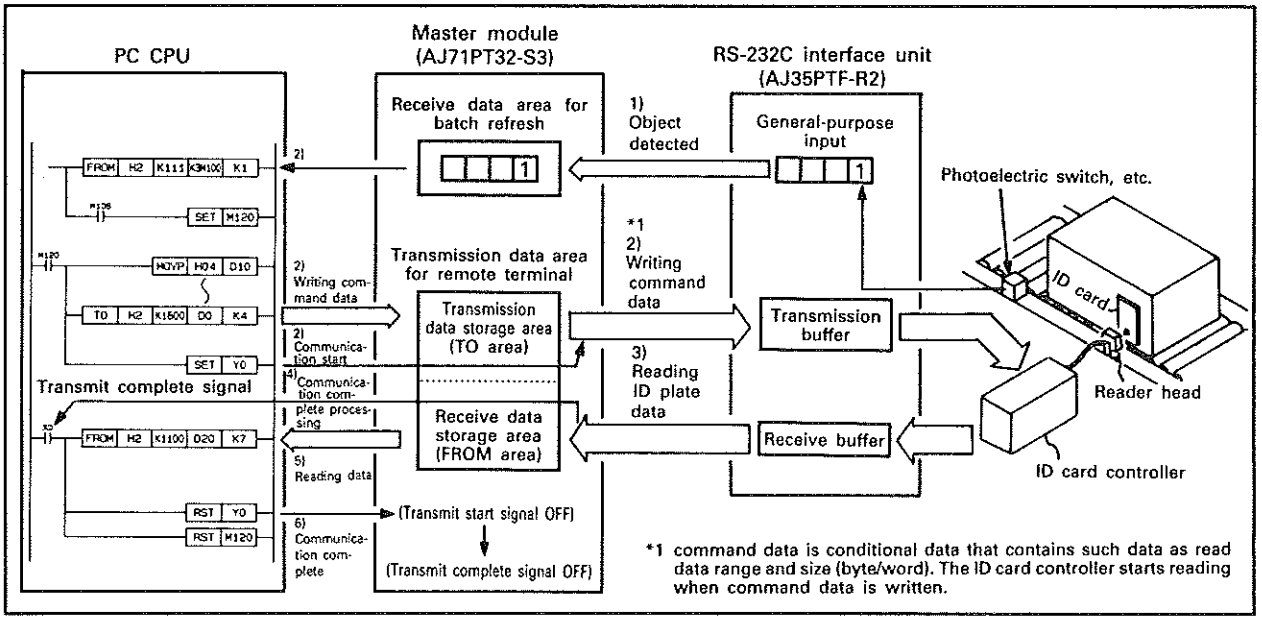
(2) The data input timing is indicated below.



3.5.2 Input data from an ID card controller

Data is input from an ID card controller via the RS-232C interface unit using the special protocol indicated below.
The special protocol is a special, predetermined communication procedure used to control communication.
The special protocol enables the user to input data using a simple program by providing automatic processing of the control codes used in communication.

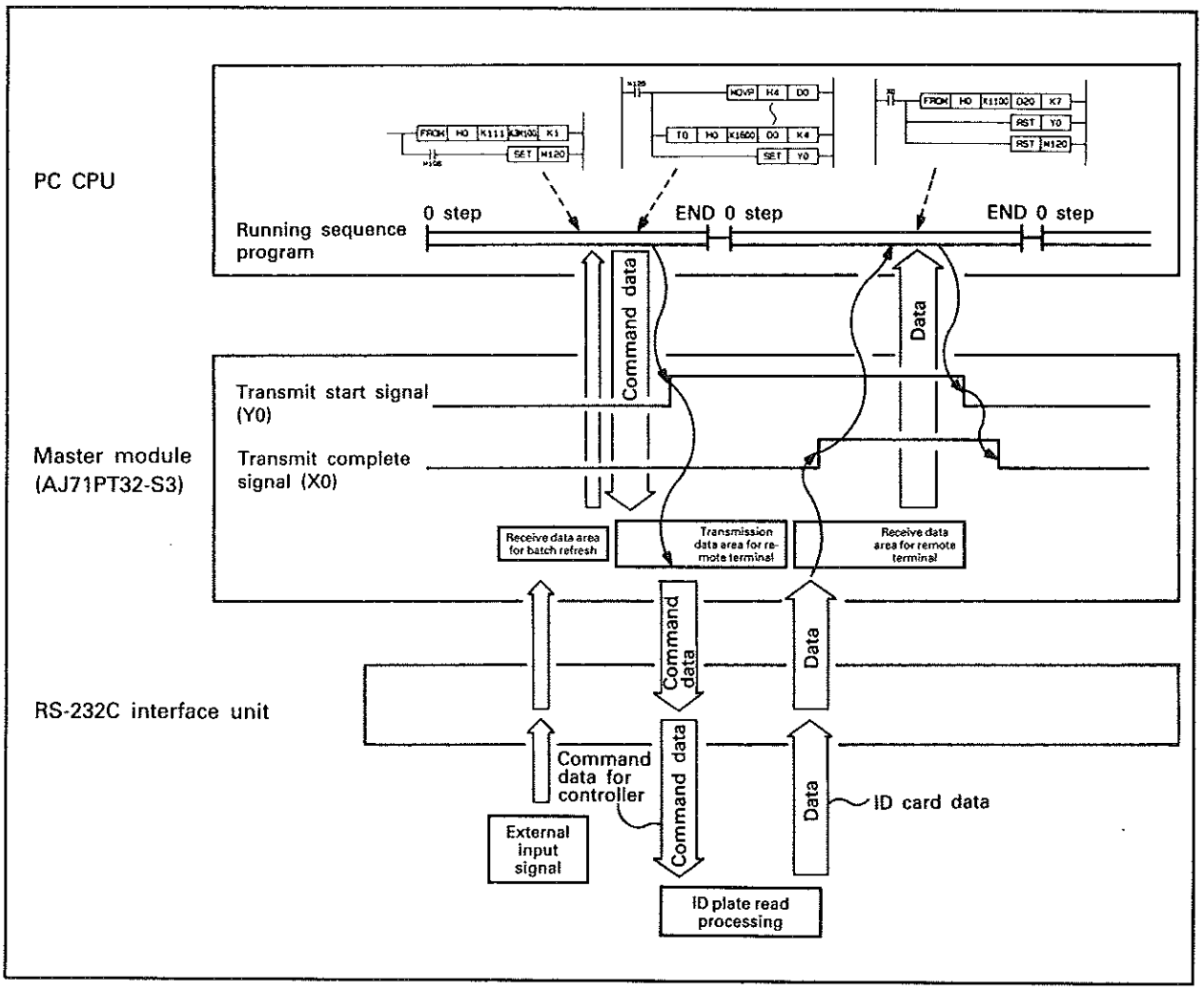
(1) The following section describes the procedure for data input
For data input using an ID card controller, data reading processing begins by writing the command data upon detecting the object using general purpose inputs.



1) The photoelectric switch detects whether an ID card has been placed within the reading area of the ID card controller and transmits the data as general-purpose input. General-purpose input data is automatically stored in the receive data area for the batch refresh type remote I/O unit using the I/O refresh of the master module.
2) When it is detected that the object to be read is set in place, the command data is read and the transmit request signal is set to ON by the sequence program.
When the transmit request signal is set to ON, the command data written in the master module by the sequence program is automatically output to the controller via the RS-232C interface unit over a series of I/O refresh cycles.
The controller reads data based on the command data that is input.
3) The data read from the ID card is transmitted automatically to the master module over a series of I/O refresh cycles.
4) When the data read from the ID card is received in the master module, the read complete signal is set to ON in relation to the PC CPU.

5) When the ON status of the read request signal is detected, the data contained in the master module is read using the FROM instruction by the sequence program.
6) When the data read processing is completed, the sequence program sets the transmit request signal to OFF.
The master module automatically sets the transmit complete signal to OFF when the transmit request signal is set to OFF.
Setting the read complete signal to OFF enables the next data to be input.
(Data cannot be input while the read complete signal is ON.)

(2) The data input timing is indicated below.

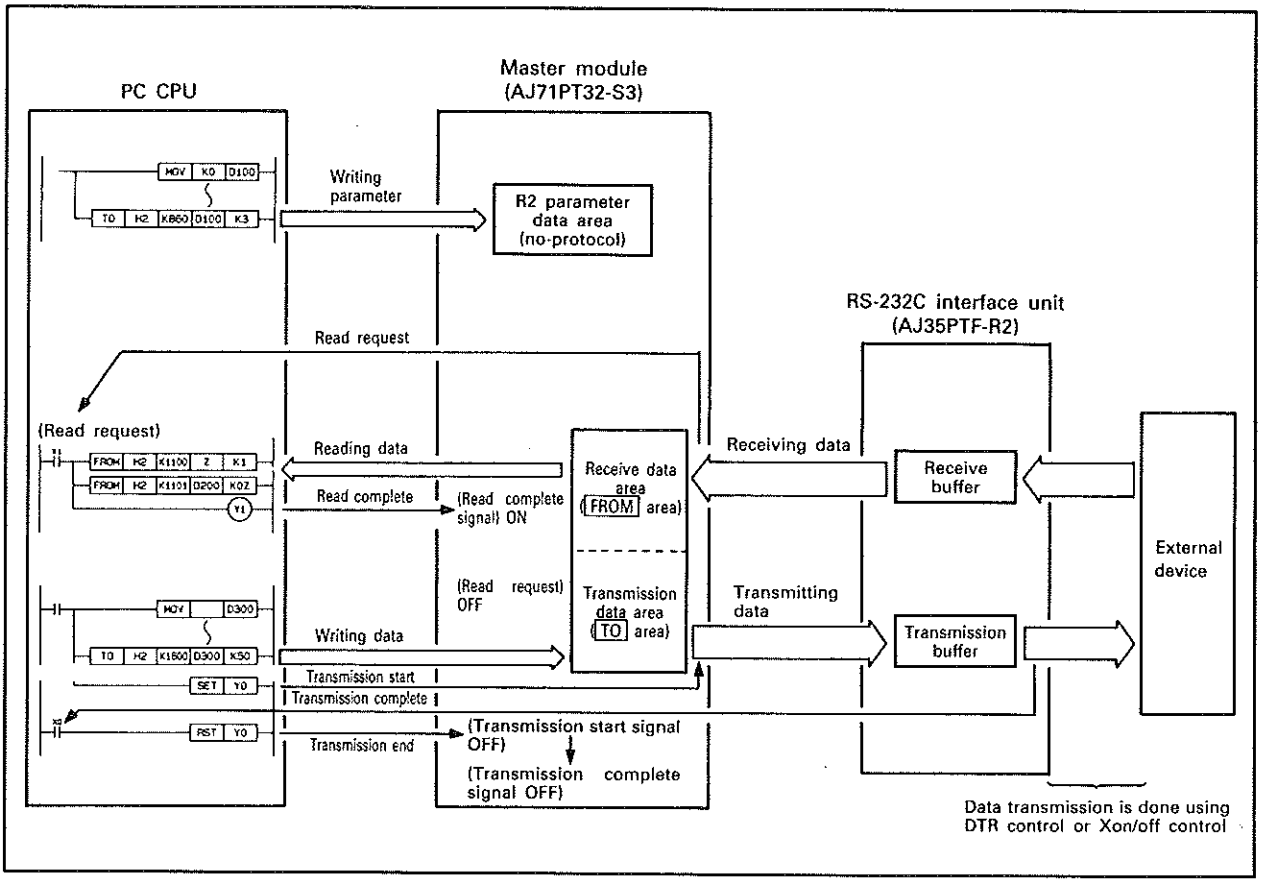


3.5.3 Communication in the no-protocol mode

The no-protocol communication mode enables the transfer of data between the RS-232C interface unit and external device that conforms to the RS-232C specifications.
Communication with external device is conducted using the transmission specifications indicated in the following table.

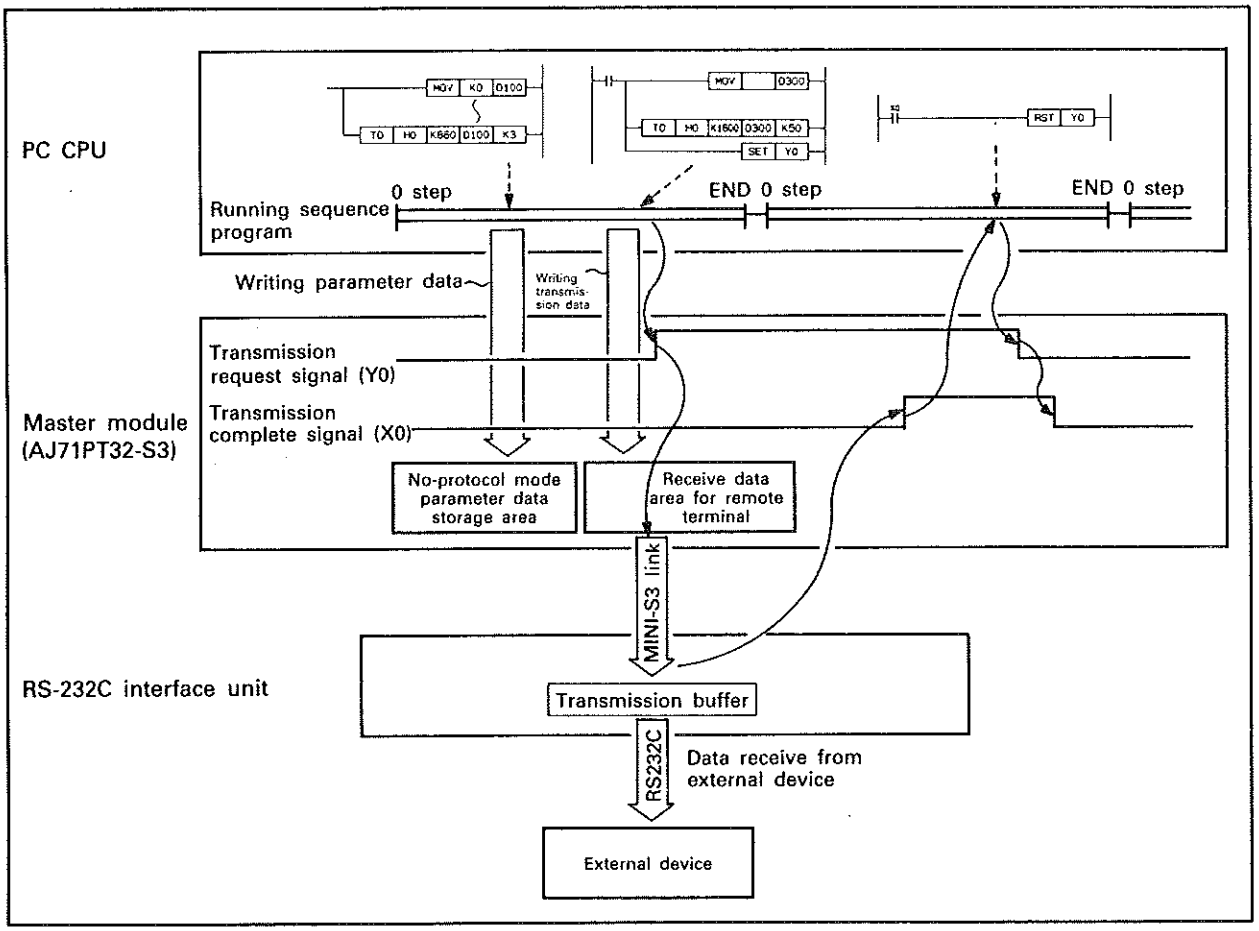
Item		Specification
Interface		EIA RS-232C standard
Transmission Method		Full-duplex
Synchronous system		Start-stop transmission
Transmission rate (BPS)		300, 600, 1200, 2400, 4800, 9600, 19200
Data format	Start bit	1
	Data bit	7 or 8
	Parity bit	1 or none
	Stop bit	1 or 2
Error detection		Parity check (even/odd)/none
Transmission control		DTR control or Xon/off control
Transfer distance		15m (49.2ft)

(1) The following section describes the method for data input. Communication with external device that is conducted in the no-protocol mode is enabled by setting the parameters for the RS-232C interface unit no-protocol mode in the R2 parameter data area of the buffer memory in the master module.



Method of data transmission

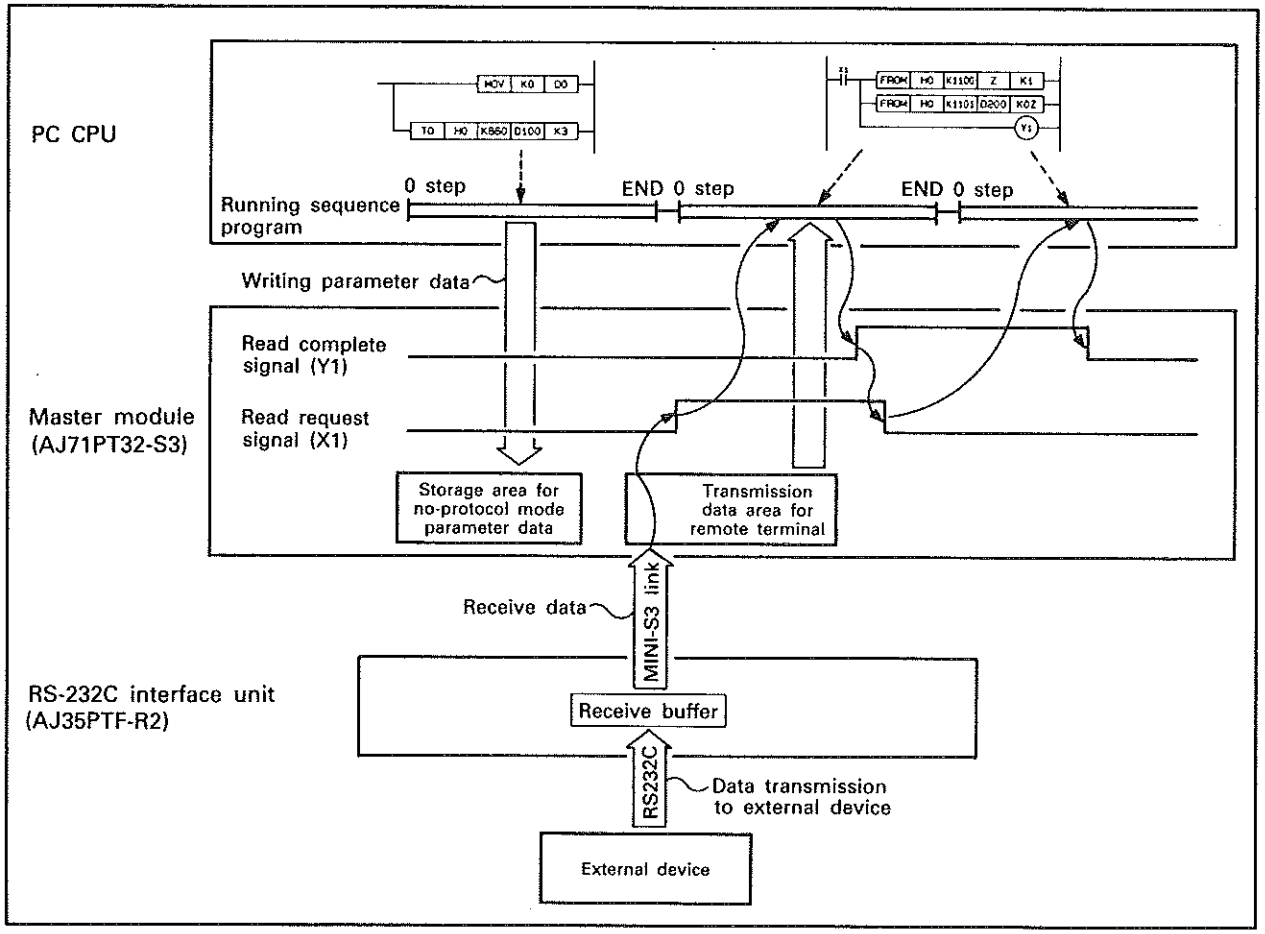
1) No-protocol mode parameters are set in the master module using the TO instruction of the sequence program.
2) Data to be transmitted to external device is written to the transmission data area of the master module by the sequence program.
3) When data settings in the transmission data area have been completed, the sequence program sets the transmit request signal to ON.
   When the transmit request signal is set to ON, the data contained in the transmission data area is transmitted automatically to the RS-232C interface unit over a series of I/O refresh cycles.
   The RS-232C interface unit automatically transmits the data received in the transmit buffer from the master module to the external device.
4) The master module sets the transmit complete signal to ON for the PC CPU when transmission of the data to the RS-232C interface unit has been completed.
   When the ON status of the transmit complete signal is detected, the transmit request signal is set to OFF by the sequence program.
   When the transmit request signal is set to OFF, the master module automatically sets the transmit complete signal to OFF.
   Setting the transmit complete signal to OFF enables the following data transmissions. (Data cannot be transmitted while the transmit complete signal is ON.)



Method of data reception

1) No-protocol mode parameters are set in the master module using the TO instruction of the sequence program.
2) Data received from external device is stored in the receive buffer of the RS-232C interface unit.
3) When the data has been stored in the receive buffer of the RS-232C interface unit, the RS-232C interface unit automatically transmits the data to the master module over a series of I/O refresh cycles.
4) When the data is received in the master module, the read request signal is set to ON in relation to the PC CPU.
5) When the ON status of the read request signal is detected, the data contained in the master module is read using the FROM instruction by the sequence program.
6) When the data read processing is completed, the sequence program sets the read complete signal to ON.
   The master module automatically sets the read request signal to OFF when the read request signal is set to ON.
   Setting the read complete signal to OFF enables the next data to be input.
   (Data cannot be input while the read request signal is ON.)

The data input timing is indicated below.

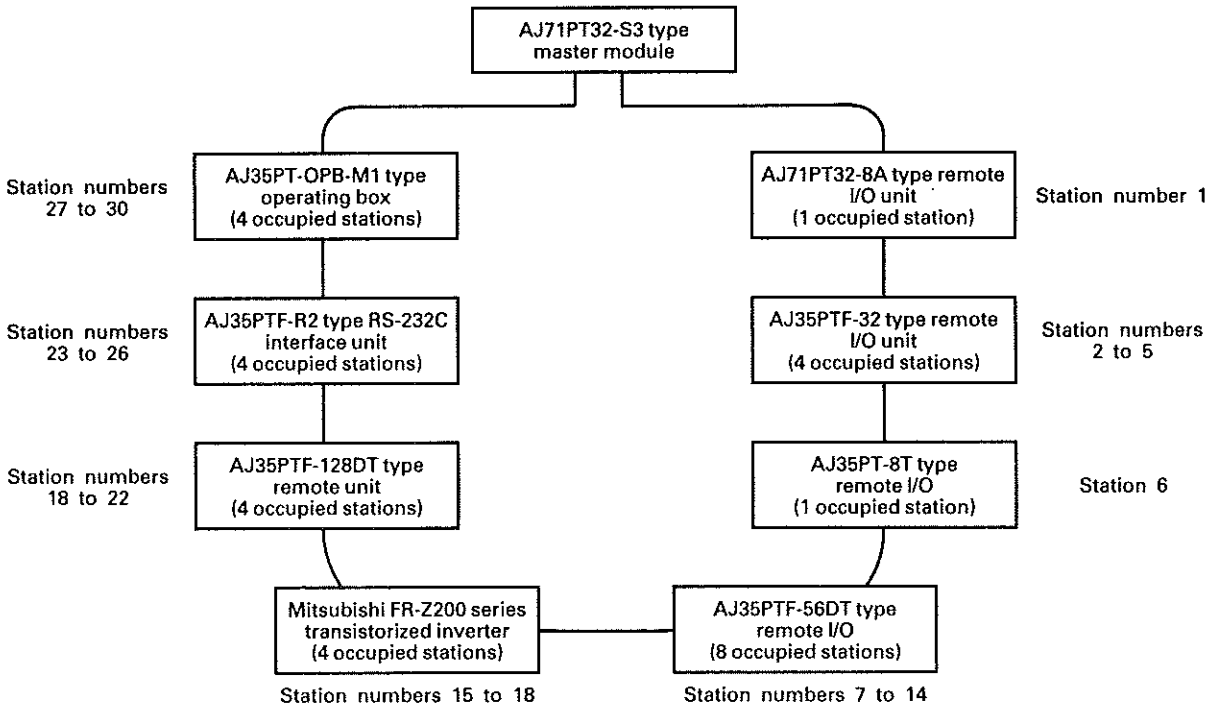


3.6 Station Numbers and Communication Areas for Remote Units

The area used for communication between the master module and each of the remote units is dependent on the remote unit station numbers.
The buffer memory is contained in the master module and used for communication between the master module and each of the remote units. Each remote unit is assigned an area of the buffer memory by station number to use for communication.

(1) Station numbers and number of occupied stations for remote units

Each slave station connected in the MINI-S3 link is allocated 1 station number for each set of 8 I/O points.
Remote I/O units having more than 8 I/O points occupy more than one station number.
For further information concerning the number of occupied stations for each remote I/O unit, see the relevant remote unit user's manual.
The number of occupied stations for each remote terminal unit is 4.



For further information concerning the methods used to set station numbers for each of the remote units, see Section 5.4.

(2) Station numbers and buffer memory assignments for batch refresh type remote I/O units

(a) Communication between the master module and batch refresh type remote I/O units requires use of the transmission data area and receive data area for batch refresh in the buffer memory of the master module.

(b) The transmission data area and receive data area for batch refresh is allocated to each remote unit by station number as indicated below.
Data communication between the master module and batch refresh type remote I/O units is conducted using the area which corresponds to the station number of the remote unit with which communication is being conducted.

Transmission data area for batch refresh
(Receive data area for batch refresh)

Address	b15 to b8	b7 to b0
10 (110)	Station 2	Station 1
11 (111)	Station 4	Station 3
12 (112)	Station 6	Station 7
13 (113)	Station 8	Station 7
⟨		
40 (140)	Station 62	Station 61
41 (141)	Station 64	Station 63

( ) contains address of receive data area

(c) 8 I/O points are used by 1 station number.

(d) When the number of occupied stations in a remote unit is two or more, the amount of buffer memory area used is equal to the number of stations.

Example) AJ35PTF-32DT (I/O points 32, occupied stations 4) is set as station number 5.

Address Receive data area for batch refresh

112	Station 6 ; Station 5	Storage of ON/OFF status for X0 to 7
		Storage of ON/OFF status for X8 to F
113	Station 8 ; Station 7	Storage of ON/OFF status for X10 to 17
		Storage of ON/OFF status for X18 to 1F

An I/O compound unit uses the first half of the occupied station area for receive and the last half for transmit.

Example) AJ35PTF-28DT (I/O points 16, output points 12, occupied stations 4) is set as station 9.

Address Transmission data area for batch refresh

14	Station 10 ; Station 9	(Not used)
		(Not used)
15	Station 12 ; Station 11	Setting of ON/OFF status for Y10 to 17
		Setting of ON/OFF status for Y18 to 1B

Address Receive data area for batch refresh

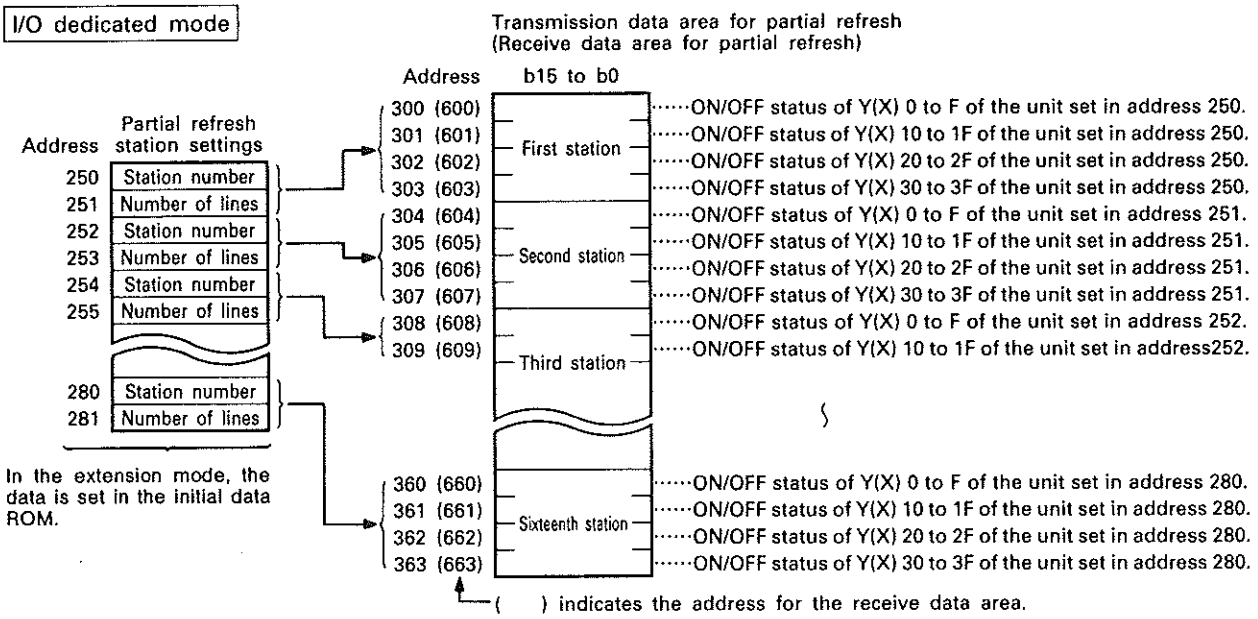
114	Station 10 ; Station 9	Storage of ON/OFF status for Y0 to 7
		Storage of ON/OFF status for X8 to F4.
115	Station 12 ; Station 11	(Not used)
		(Not used)

(3) Station numbers and buffer memory assignments for partial refresh type remote I/O units

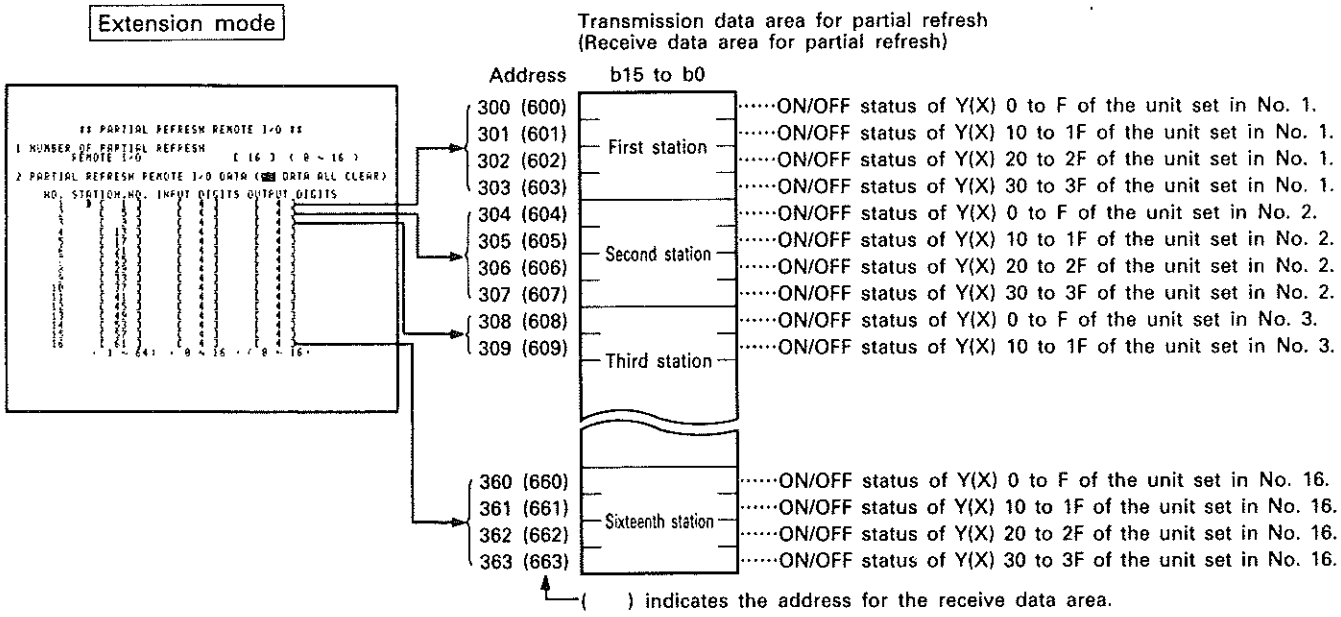
(a) Communication between the master module and partial refresh type remote I/O units requires that the station number of the partial refresh type remote I/O units be set in the partial refresh station setting area of the buffer memory in the master module.
When the master module is used in the extension mode, the initial data ROM of the master module sets the station number in the partial refresh station setting area. For further information concerning how to set the ROM, see the SW□GP-MINIP Operating Manual.

(b) The partial refresh communication area is allocated in the partial refresh station setting area according to the setting of the station number of the partial refresh type remote I/O unit.

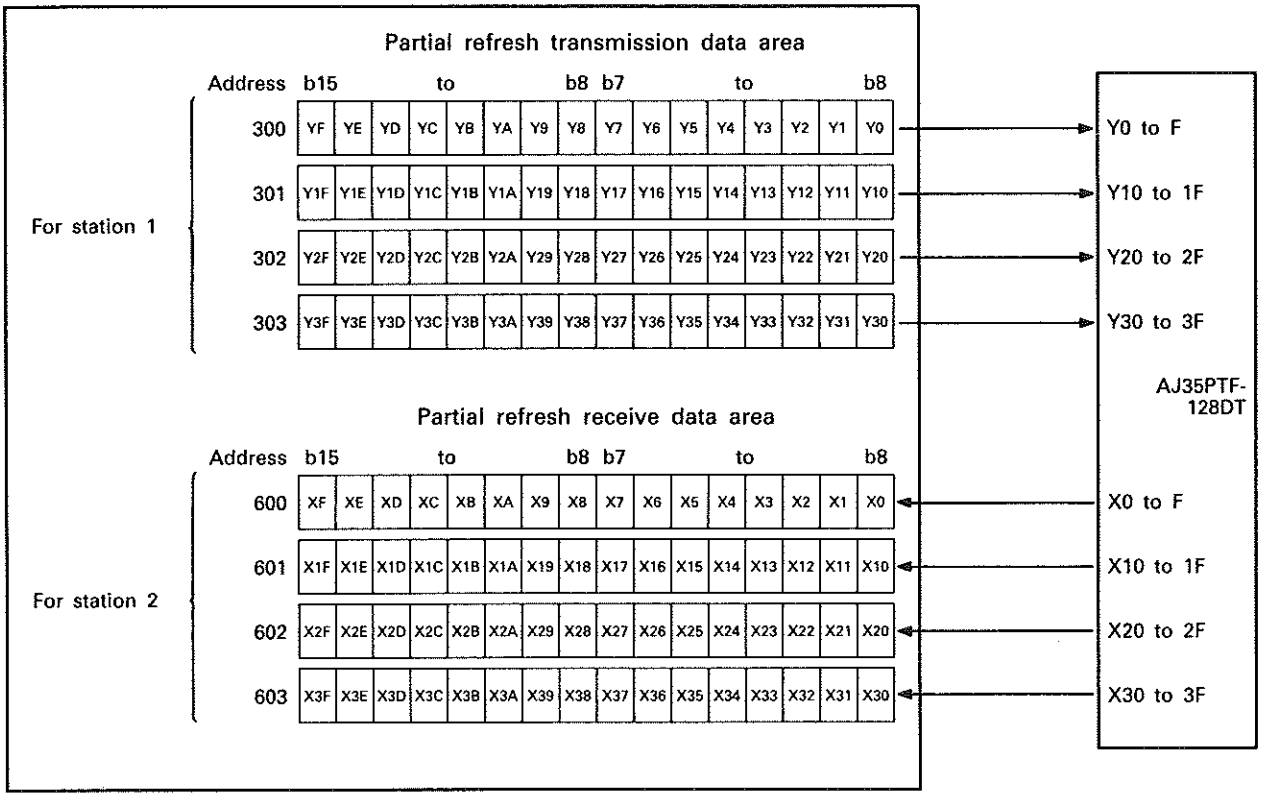
I/O dedicated mode



Extension mode



(c) The relationship between the partial refresh communication data area and the I/Os of the AJ35PTF-128DT is indicated below.



Output to any particular AJ35PTF-128DTs is transmitted by writing ON/OFF data to the area assigned to the AJ35PTF-128DT in question.
The inputs from any particular AJ35PTF-128DT can be read by using the FROM instruction to designate the area assigned to the AJ35PTF-128DT in question.

(4) Station numbers and buffer memory assignments for remote terminal units

(a) Communication between the master module and remote terminal units requires that the station number of the remote terminal units and attributes be set, and a remote terminal unit number assigned in the initial data ROM of the master module.

For further information concerning the settings, see the SW□GP-MINIP Operating Manual.

(b) The remote terminal unit communication area, which is used for communication between the remote terminal unit and the master module, is assigned to correspond to the remote terminal unit number in the manner indicated below.
Data communication between the master module and remote terminal units is conducted using the area which corresponds to the station number of the remote terminal unit with which communication is being conducted.

Communication area for remoter terminal unit

	Channel 0	Channel 1
1100 to 2099	Communication area for remote terminal unit No. 1	Communication area for remote terminal unit No. 8
2100 to 3099	Communication area for remote terminal unit No. 2	Communication area for remote terminal unit No. 9
3100 to 4099	Communication area for remote terminal unit No. 3	Communication area for remote terminal unit No. 10
to		
7100 to 8099	Communication area for remote terminal unit No. 7	Communication area for remote terminal unit No. 14

When the FROM/TO instructions issued by the PC CPU are used to read and write data, the channel number is switched using the channel switch signal ($Y_{(n+2C)}$) of the master module.

3.7 Relation between PC CPU Operating Status and I/O Refresh

I/O refresh of the MINI-S3 link is performed when the master module is in online mode (mode setting switch = 0 to 2) and $Y_{(n+18)}/Y_{(n+28)}$ (MINI-S3 link communication start) is ON.
I/O refresh stops when the MINI-S3 link communication start signal is turned OFF.

(1) Input remote I/O station
  (a) During I/O refresh, remote I/O station input data is continually stored to the receive data area (buffer memory addresses 110 to 141).
  (b) When I/O refresh is stopped, the receive data at the time of I/O refresh stop is retained.

(2) Output remote I/O station
  (a) During I/O refresh, transmission data (buffer memory addresses 10 to 41) is output to the output remote I/O stations.
  (b) When I/O refresh is stopped, the output unit states depend on their E.C. MODE switch positions.
  For full information on the E.C. MODE switch, see Sections 3.2.4, 3.3.5, and 3.4.6.

I/O Refresh / E.C. MODE Switch	During I/O Refresh ($Y_{(n+18)}/Y_{(n+28)}$ ON)	I/O Refresh Stop ($Y_{(n+18)}/Y_{(n+28)}$ OFF)
ON	Output remote I/O units are switched ON/OFF in accordance with the transmission data.	All outputs are switched OFF.
OFF		Output state at the time of I/O refresh stop is retained.

(3) Remote terminal units
  (a) Output to remote terminal units
    1) During I/O refresh, data contained in the transmission data area (addresses 1100 to 8099) is transmitted only once when the communication request signal ($Y_{(n+0)}$ to $Y_{(n+1A)}$) is set from OFF to ON.
    2) The remote terminal unit retains the data received on the previous cycle until the next cycle of data is received. (If I/O refresh is stopped, the last cycle of data is retained.)

  (b) Input from remote terminal units
    1) During I/O refresh, data transmitted to the master module is received in the receive data area (addresses 1100 to 8099) of the master module at the point the data is generated in the remote terminal unit.
    2) The last cycle of data received in the master module is retained until the next cycle of data is received. The key input area for the operating box is cleared. (If I/O refresh is stopped, the last cycle of data is retained.)

3.8 Characteristics of I/O Refresh when either a Communication or Line Error has Occurred

3.8.1 Master module error detection

When an error occurs in remote I/O unit, the master module detects the station number of the remote I/O unit and the type of error. The I/O signals of the master module are set to ON as indicated below and the error code is stored in the buffer memory.

- MINI-S3 link error detection signal ($X_{(n+6)}/X_{(n+26)}$)
- MINI-S3 link communication error signal ($X_{(n+7)}/X_{(n+27)}$)
- Remote terminal unit error detection signal ($-/X_{(n+24)}$)
- Accumulative faulty station detection (addresses 90 to 93)
- Faulty station detection (addresses 100 to 103)
- Communication error code (address 107)
- Error detection code (address 108)
- Remote terminal unit error detection (address 195)
- Remote terminal unit error code (addresses 196 to 209)

(For further information concerning the I/O signals and buffer memory, see Sections 3.9 and 3.10.)

When remote I/O units occupy more than two stations, and an error occurs in one station of an occupied station number, the station numbers for all of the occupied stations indicate an error has occurred.
For example, a compact type remote I/O unit AJ35PTF-28AS (input points: 16, output points: 12, number of occupied stations: 4) manages in units of four stations. When set to station 1 and a fuse blows, all of four stations (station 1 to station 4) are treated as faulty station.

3.8.2 Operation at an occurrence of errors

When an error occurs in the MINI-S3 link, one of the following two types of operating conditions develops.

- Communication continues (referred to as CC-type errors)
  The faulty unit is disconnected while other units continue to operate normally.
- Communication stops (referred to as CS-type errors)
  Even if an error occurs in only one unit, communication stops between all units.

(For further information concerning the two types of errors, see Section 6.1.)

(1) Operation when CC-type errors occur
When a CC-type error occurs, error processing occurs only in relation to the faulty unit. Other units continue normal communication.

(a) Input data from remote I/O units
Input data from faulty remote I/O units is processed in one of the two following ways depending on faulty station data clear specification ($Y_{(n+1B)}$/$Y_{(n+2B)}$).

1) When the faulty station data clear specification and receive data clear request are OFF
The input data from the faulty remote I/O unit is not stored in the buffer memory.
Data received directly prior to the communication error is retained.
For example, in the case when 10 remote I/O units are connected and an error occurs in station 5, the input data of station 5 is that data which existed prior to the error. However, the input data of station 1 to 4 and 6 to 10 is stored.

2) When the faulty station data clear specification and receive data clear request are ON
All points for the input data of the faulty remote I/O unit are either set to OFF or cleared.

(b) Output data to the remote I/O units
Output data to faulty remote I/O units is processed in one of the two following ways depending on the setting of the operation mode switch.

1) Automatic online return ON (0)
The transmission data set in the buffer memory transmit area is output.

2) Automatic online return OFF (1)
Off data is output.
If the fault is in an remote I/O unit, OFF data is output. If the fault is in a remote terminal unit, data is not transmitted even if the transmit request signal is ON.

(2) Operation when CS-type errors occur
The following errors will stop communication.
- Initialize data error
  the total number of remote stations (1 to 64)
  the number of retries (1 to 32)
  line error check (0 to 2), or
  No-protocol mode parameters
  An I/O refresh was started when an erring setting existed in:
- Line error
  Open in data link cables or no power is being supplied to the remote I/O unit(s).
- Faulty station
  A communication error occurs with either of remote I/O unit when the operation mode switch was set to stop communication when an online error is detected (2).

(a) When an initialize data error occurs, the master module does not perform I/O refresh.

(b) Operation when a line error occurs
1) Input data from a remote I/O unit
When a fault occurs in a line, none of the input data from any of the remote I/O units is stored in the buffer memory.
Data received directly prior to the fault occurring in the line is retained.
2) Output data to remote I/O units
When a fault occurs in a line, output data to remote I/O units is processed in one of the two following ways depending on the E.C. mode setting of the output remote I/O unit.

E.C. Mode Setting	Output Data of the Remote I/O Unit
OFF	Retain data that existed directly prior to the error.
ON	All outputs are switched OFF.

For further information, concerning the E.C. mode setting, see Remote I/O Unit User's Manual.

3) For further information concerning the location of fault when a fault occurs in lines, see Section 5.6.

(c) Operation when a fault occurs in a station
When a communication error occurs in any remote I/O unit with the operation mode switch is set to "2" (stop communication when an online error is detected), MINI-S3 link communication stops.

1) Input data from the remote I/O unit
When a communication error has occurred in a remote I/O unit and communication has stopped, none of the input data from any of the remote I/O units is stored in the buffer memory.
Data received directly prior to the communication error occurring in the remote I/O unit is retained.
2) Output data to the remote I/O units
If a communication error occurs in a remote unit and communication is stopped, data is not transmitted by a remote terminal unit even if the transmit request signal is on.
The status of the output of the remote I/O units are dependent on the E.C mode settings of output remote I/O units as indicated below.

E.C. Mode Setting	Output Data of the Remote I/O Unit
OFF	Retain data that existed directly prior to the error.
ON	All outputs are switched OFF.

For further information, concerning the E.C. mode setting, see Remote I/O Unit User's Manual.

3.9 I/O List for the PC CPU

(1) I/O list for the I/O dedicated mode
A list for I/O signals when the master module is being used in the I/O dedicated mode is indicated in Table 3.1.
The letter "n" in the Device No. column is the head I/O number of the master module and is determined by the mounted location of the master module and the number of points of the I/O units mounted in the slot in front of the master module.

(For example: When the head I/O number of the master module is "X/Y20":
$X_{(n+0)}$ to $X_{(n+1F)}$ = X20 to X3F
$Y_{(n+0)}$ to $Y_{(n+1F)}$ = Y20 to Y3F)

Device No.	Signal	Device No.	Signal
$X_{(n+0)}$	Hardware fault	$Y_{(n+0)}$	Reserved
$X_{(n+1)}$	MINI-S3 link communicating		
$X_{(n+2)}$	Reserved		
$X_{(n+3)}$			
$X_{(n+4)}$			
$X_{(n+5)}$	Test mode		
$X_{(n+6)}$	MINI-S3 link error detection		
$X_{(n+7)}$	MINI-S3 link communication error		
$X_{(n+8)}$	Reserved	to	
to		$Y_{(n+17)}$	
		$Y_{(n+18)}$	MINI-S3 link communication start
		$Y_{(n+19)}$	Reserved
		$Y_{(n+1A)}$	FROM/TO instruction response designation
		$Y_{(n+1B)}$	Faulty station data clear designation
		$Y_{(n+1C)}$	Reserved
		$Y_{(n+1D)}$	Error reset
		$Y_{(n+1E)}$	Reserved
$X_{(n+1F)}$		$Y_{(n+1F)}$	

Table 3.1 I/O Signal List

(2) I/O list for the extension mode

A list for I/O signals when the master module is being used in the extension mode is indicated in Table 3.2.

The letter "n" in the Device No. column is the head I/O number of the master module and is determined by the mounted location of the master module and the number of points of the I/O units mounted in the slot in front of the master module.

(For example: When the head I/O number of the master module is "X/Y20":
$X_{(n+0)}$ to $X_{(n+2F)}$ = X20 to X4F
$Y_{(n+0)}$ to $Y_{(n+2F)}$ = Y20 to Y4F)

Device No.	Signal		Device No.	Signal	
$X_{(n+0)}$	Transmit complete signal	For remote terminal unit No. 1	$Y_{(n+0)}$	Transmit request signal	For remote terminal unit No. 1
$X_{(n+1)}$	Read request signal		$Y_{(n+1)}$	Read complete signal	
$X_{(n+2)}$	Transmit complete signal	For remote terminal unit No. 2	$Y_{(n+2)}$	Transmit request signal	For remote terminal unit No. 2
$X_{(n+3)}$	Read request signal		$Y_{(n+3)}$	Read complete signal	
$X_{(n+4)}$	Transmit complete signal	For remote terminal unit No. 3	$Y_{(n+4)}$	Transmit request signal	For remote terminal unit No. 3
$X_{(n+5)}$	Read request signal		$Y_{(n+5)}$	Read complete signal	
$X_{(n+6)}$	Transmit complete signal	For remote terminal unit No. 4	$Y_{(n+6)}$	Transmit request signal	For remote terminal unit No. 4
$X_{(n+7)}$	Read request signal		$Y_{(n+7)}$	Read complete signal	
$X_{(n+8)}$	Transmit complete signal	For remote terminal unit No. 5	$Y_{(n+8)}$	Transmit request signal	For remote terminal unit No. 5
$X_{(n+9)}$	Read request signal		$Y_{(n+9)}$	Read complete signal	
$X_{(n+A)}$	Transmit complete signal	For remote terminal unit No. 6	$Y_{(n+A)}$	Transmit request signal	For remote terminal unit No. 6
$X_{(n+B)}$	Read request signal		$Y_{(n+B)}$	Read complete signal	
$X_{(n+C)}$	Transmit complete signal	For remote terminal unit No. 7	$Y_{(n+C)}$	Transmit request signal	For remote terminal unit No. 7
$X_{(n+D)}$	Read request signal		$Y_{(n+D)}$	Read complete signal	
$X_{(n+E)}$	Transmit complete signal	For remote terminal unit No. 8	$Y_{(n+E)}$	Transmit request signal	For remote terminal unit No. 8
$X_{(n+F)}$	Read request signal		$Y_{(n+F)}$	Read complete signal	
$X_{(n+10)}$	Transmit complete signal	For remote terminal unit No. 9	$Y_{(n+10)}$	Transmit request signal	For remote terminal unit No. 9
$X_{(n+11)}$	Read request signal		$Y_{(n+11)}$	Read complete signal	
$X_{(n+12)}$	Transmit complete signal	For remote terminal unit No. 10	$Y_{(n+12)}$	Transmit request signal	For remote terminal unit No. 10
$X_{(n+13)}$	Read request signal		$Y_{(n+13)}$	Read complete signal	
$X_{(n+14)}$	Transmit complete signal	For remote terminal unit No. 11	$Y_{(n+14)}$	Transmit request signal	For remote terminal unit No. 11
$X_{(n+15)}$	Read request signal		$Y_{(n+15)}$	Read complete signal	
$X_{(n+16)}$	Transmit complete signal	For remote terminal unit No. 12	$Y_{(n+16)}$	Transmit request signal	For remote terminal unit No. 12
$X_{(n+17)}$	Read request signal		$Y_{(n+17)}$	Read complete signal	
$X_{(n+18)}$	Transmit complete signal	For remote terminal unit No. 13	$Y_{(n+18)}$	Transmit request signal	For remote terminal unit No. 13
$X_{(n+19)}$	Read request signal		$Y_{(n+19)}$	Read complete signal	
$X_{(n+1A)}$	Transmit complete signal	For remote terminal unit No. 14	$Y_{(n+1A)}$	Transmit request signal	For remote terminal unit No. 14
$X_{(n+1B)}$	Read request signal		$Y_{(n+1B)}$	Read complete signal	
$X_{(n+1C)}$	Reserved		$Y_{(n+1C)}$	Reserved	
$X_{(n+1D)}$			$Y_{(n+1D)}$		
$X_{(n+1E)}$			$Y_{(n+1E)}$		
$X_{(n+1F)}$			$Y_{(n+1F)}$		
$X_{(n+20)}$	Hardware fault		$Y_{(n+20)}$		
$X_{(n+21)}$	MINI-S3 link communicating		$Y_{(n+21)}$		
$X_{(n+22)}$	Reserved		$Y_{(n+22)}$		
$X_{(n+23)}$	Receive data clear completion (for AJ35PTF-R2)		$Y_{(n+23)}$	Receive data clear request (for AJ35PTF-R2)	
$X_{(n+24)}$	Remote terminal unit error detection		$Y_{(n+24)}$	Remote terminal unit error detection clear	
$X_{(n+25)}$	Test mode		$Y_{(n+25)}$	Reserved	
$X_{(n+26)}$	MINI-S3 link error detection		$Y_{(n+26)}$		
$X_{(n+27)}$	MINI-S3 link communication error		$Y_{(n+27)}$		
$X_{(n+28)}$	ROM error		$Y_{(n+28)}$	MINI-S3 link communication start	
$X_{(n+29)}$	Reserved		$Y_{(n+29)}$	Reserved	
$X_{(n+2A)}$			$Y_{(n+2A)}$	FROM/TO instruction response designation	
$X_{(n+2B)}$			$Y_{(n+2B)}$	Faulty station data clear designation	
$X_{(n+2C)}$			$Y_{(n+2C)}$	Switching buffer memory channel	
$X_{(n+2D)}$			$Y_{(n+2D)}$	Error reset	
$X_{(n+2E)}$			$Y_{(n+2E)}$	Reserved	
$X_{(n+2F)}$			$Y_{(n+2F)}$		

3.9.1 Detailed explanation concerning I/O signals

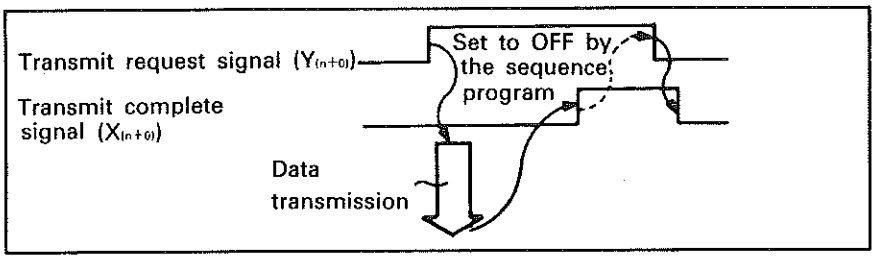
The values contained in ( ) indicate the device numbers used in Tables 3.1 and 3.2.

(1) Transmit complete signal (I/O dedicated mode: Irrelevant/Extension mode: $(X_{(n+0)}$ to $X_{(n+1A)})$

(a) The transmit complete signal indicates whether the transmission of data has been completed normally or not after data has been transmitted to a remote terminal unit.

(b) The transmission of data to a remote terminal unit starts when the transmit request signal ($Y_{(n+0)}$ to $Y_{(n+1A)}$) is set to ON.

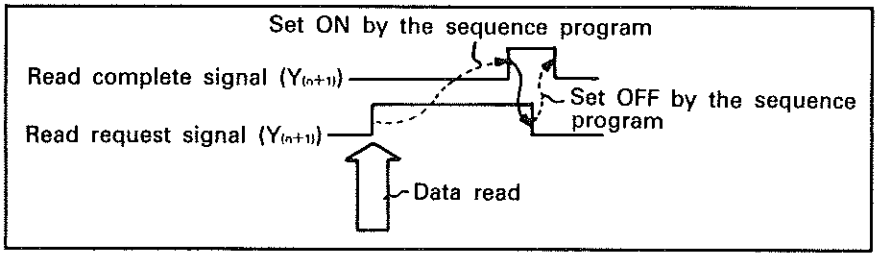
(c) Each transmit complete signal is set to ON after the relevant transmit request signal is set to ON and the transmission of the data has been completed normally, and are set to OFF when the transmit request signal is set to OFF.



(d) The device numbers used with the transmit complete signal varies with each remote terminal unit number.
The remote terminal unit number is set by the initial data setting of the master module and is assigned to each remote terminal unit.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(2) Read request signal (I/O dedicated mode: Irrelevant/Extension mode: ($X_{(n+1)}$ to $X_{(n+1B)}$)

(a) The master module turns the read request signal ON when data is received from the remote terminal unit.
(b) Data is received from the remote terminal units automatically during MINI-S3 link I/O refresh regardless of the sequence program scan.
Therefore, the read request signal is used as the condition to execute the FROM instruction when reading the receive data using the FROM instruction.
(c) The read request signal is set OFF when the read complete signal ($Y_{(n+0)}$ to $Y_{(n+1B)}$) is set to ON.
(d) During the period that the read request signal is ON, the master module cannot receive data.



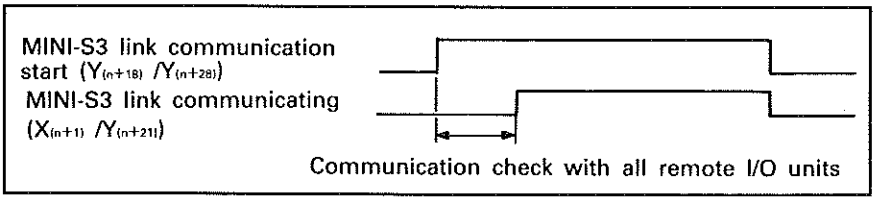
(e) The device number used with the read request signal varies with each remote terminal unit number.
The remote terminal unit number is set by the initial data setting of the master module and is assigned to each remote terminal unit.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(3) Hardware fault (I/O dedicated mode: $X_{(n+0)}$ /extension mode: $X_{(n+20)}$)

(a) On indicates that the master module mode setting switch has been set to any of 6 to 9 or a hardware fault has occurred.
(b) Used as an interlock for the FROM/TO instruction to the master module.

(4) MINI-S3 link communicating (I/O dedicated mode: $X_{(n+1)}$ /extension mode: $X_{(n+21)}$)

(a) On indicates that the master module mode has communicated with all remote I/O stations once after Y18(MINI-S3 link communication start) is switched ON.
(b) The receive data area of the buffer memory corresponding to AJ35PTF-R2 is cleared when the receive data clear request signal ($Y_{(n+23)}$) is set to ON.
(c) Used as an interlock for data transfer to and from the master module.

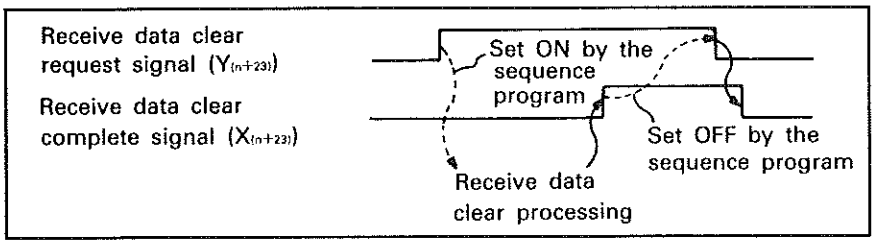


(5) Receive data clear complete signal (I/O dedicated mode: Irrelevant/Extension mode: $(X_{(n+23)})$

(a) The receive data clear complete signal indicates whether the receive data area of the buffer memory corresponding to the AJ35PTF-R2 has been cleared normally or not.

(b) The receive data area of the buffer memory corresponding to the AJ35PTF-R2 is cleared when the receive data clear request signal $(Y_{(n+23)})$ is set to ON.

(c) The receive data clear complete signal is set to ON after the receive data clear request signal is set to ON and the receive data area has been cleared normally, and is set to OFF when the receive data clear request signal is set to OFF.



REMARKS

The AJ35PTF-R2 and areas, that are to be cleared in receive data clear processing, are set in the buffer memory (address: 858, 859) of the master module.

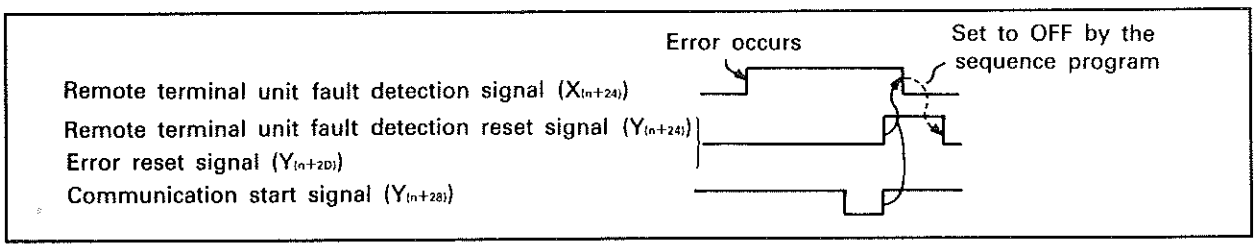
(6) Remote terminal unit fault detection (I/O dedicated mode: Irrelevant/Extension mode: $(X_{(n+24)})$

(a) The remote terminal unit fault detection signal is set to ON when an error occurs during communication between a remote terminal unit and the master module.

(b) The table in section 6.2 provides a list of faults and errors that can be detected by the remote terminal unit fault detection signal.

(c) When an error occurs, the faulty station number is stored in address 195 of the buffer memory and the error code in addresses 196 to 209.
The remote terminal unit fault detection signal is set to ON when one of the bits of address 195 in the buffer memory is set to "1".

(d) The remote terminal unit fault detection signal is set to OFF when either the remote terminal unit fault detection reset signal $(Y_{(n+24)})$ or the error reset signal $(Y_{(n+2D)})$ is set to ON. (The ON /OFF status of the error reset signal is set to OFF when the communication start signal (effective only when $(Y_{(n+28)})$ is OFF) or the communication start signal $(Y_{(n+28)})$ is set from OFF to ON.



(e) MINI-S3 link communication continues even if the remote terminal unit fault detection signal is set to ON.

(7) Test mode (I/O dedicated mode: $X_{(n+6)}$/extension mode: $X_{(n+25)}$)

(a) On indicates that the power is switched ON with the mode setting switch in any of 3 to 5.

(8) MINI-S3 link error detection (I/O dedicated mode: $X_{(n+6)}$/extension mode: $X_{(n+26)}$)

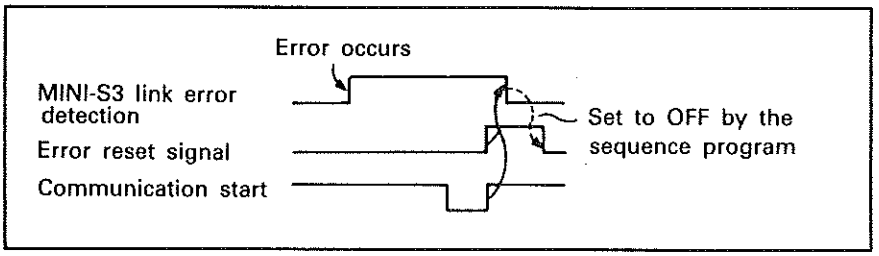
(a) This signal detects if the receive data from the remote unit is normal or not.

(b) The master module checks the receive data from the remote unit and, if an error occurs, the signal is set to ON.

(c) The MINI-S3 link error detection signal operates in one of three following ways depending on the setting of the operation mode.

1) Operation mode setting specified for automatic online return ON
Data communication continues even though an error occurs setting the MINI-S3 link error detection signal to ON.
The signal is automatically set to OFF with the next communication that is performed without an error.

2) Operation mode setting specified for automatic online return OFF
When an error has been detected, the MINI-S3 link error detection signal is retained ON.
The MINI-S3 link error detection signal is set to OFF by setting the start signal ($Y_{(n+18)}$/$Y_{(n+28)}$) to OFF, and the error reset signal ($Y_{(n+1D)}$/$Y_{(n+2D)}$) to ON.
The MINI-S3 link error detection signal is also set to OFF when the start signal ($Y_{(n+18)}$/$Y_{(n+28)}$) switches from OFF to ON.



3) Operation mode setting specified for communication stop at the time of online error detection.
The MINI-S3 link error detection signal is set to neither ON nor OFF when an error has been detected.
The MINI-S3 link communication error signal ($X_{(n+7)}$/$X_{(n+27)}$) is set to ON when an error in the receive data is detected.

(d) The error detection code is stored in address 108 of the buffer memory when the MINI-S3 link error detection signal is set to ON.

(9) MINI-S3 link communication error (I/O dedicated mode: $X_{(n+7)}$/extension mode: $X_{(n+27)}$)

(a) This signal detects if an error has occurred in the MINI-S3 link line or not.

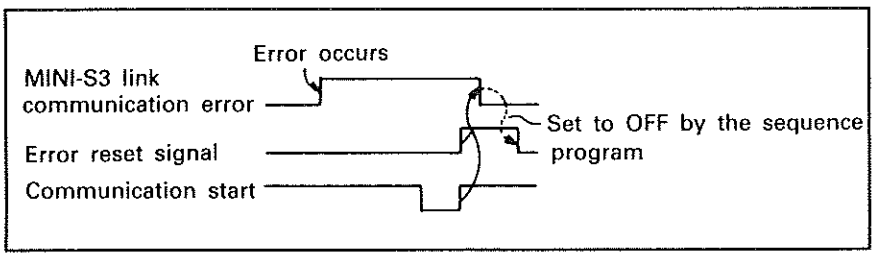
(b) If an error has occurred in the MINI-S3 link line, the signal is set to ON.

(c) The signal is set to ON when:
- Any remote I/O unit power supply is switched OFF.
- Any data link cable is broken.
- A communication error has occurred with the mode setting specified for communication stop at the time of online error detection.

(d) The MINI-S3 link communication error signal operates in one of the following three ways depending on the setting of the operation mode.

1) Operation mode setting specified for automatic online return ON
Data communication continues even though an error occurs setting the MINI-S3 link communication error signal to ON. The signal is automatically set to OFF with the next communication that is performed without an error.

2) Operation mode setting specified for automatic online return OFF, or for communication stop at the time of online detection.
When an error has been detected, the MINI-S3 link communication error signal is retained ON, and the communication does not return online even if the fault is repaired.
For information concerning the output of data during communication error periods, see Section 3.8.
The MINI-S3 link communication error signal is set to OFF by setting the communication start signal ($Y_{(n+18)}$/$Y_{(n+28)}$) to OFF, and the error reset signal ($Y_{(n+1D)}$/$Y_{(n+2D)}$) to ON.
The MINI-S3 link communication error signal is also set to OFF when the start signal ($Y_{(n+18)}$/$Y_{(n+28)}$) switches from OFF to ON.



(e) The communication error code is stored in address 107 of the buffer memory, when the MINI-S3 link communication error signal is set to ON.

(10) ROM error signal (I/O dedicated mode: Irrelevant/Extension mode: $X_{(n+28)}$)

(a) The ROM error signal checks the status of the initial data ROM and message ROM and determines whether it is normal or not when the master module is used in the extension mode.

(b) The ROM error signal is set to ON by the following causes.

- Initial data ROM is not installed
- Initial data is not written
- Initial data ROM is faulty
- The number of remote stations set in the initial data ROM is not within the 1 to 64 station range.
- Message ROM is not installed
- Message data is not written
- Message ROM is faulty

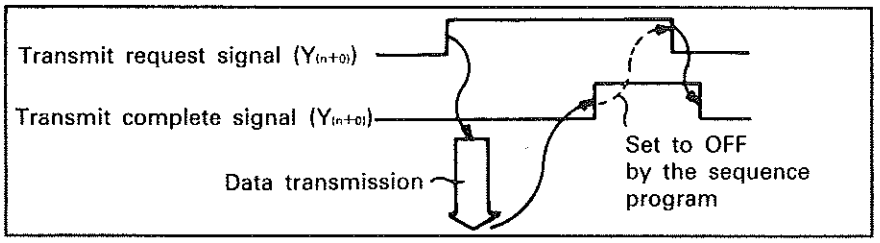
} These are checked only if it has been specified that the operating box is being used.

(11) Transmit request signal (I/O dedicated mode: Irrelevant/Extension mode: ($Y_{(n+0)}$ to $Y_{(n+1A)}$)

(a) The transmit request signal is set to ON by the sequence program when data is being transmitted with the remote terminal units.

(b) Data is transmitted to the relevant remote terminal unit when the transmit request signal is set to ON.

(c) The transmit complete signal ($X_{(n+0)}$ to $X_{(n+1A)}$) is set to ON when the transmission of the data completes normally.

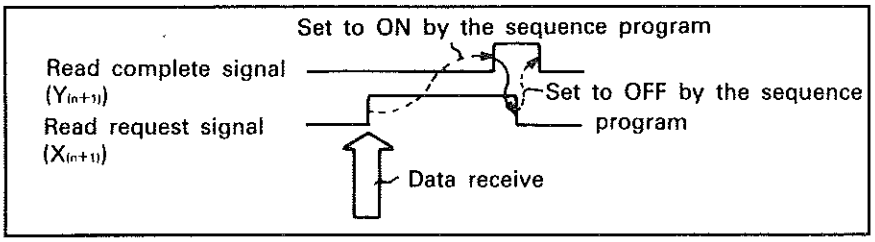


(d) The device numbers used with the transmit request signal varies with each remote terminal unit number.
The remote terminal unit number is set by the initial data setting of the master module and is assigned to each remote terminal unit.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(12) Read complete signal (I/O dedicated mode: irrelevant/Extension mode: $Y_{(n+1)}$ to $Y_{(n+1B)}$)

(a) The read complete signal indicates the master module that the data received from the remote terminal units has been read as instructed by the sequence program. The read complete signal is set to ON by the sequence program.

(b) The master module sets the read request signal ($X_{(n+1)}$ to $X_{(n+1B)}$) to on when data has been received from the remote terminal units and requests that the data be read by the sequence program.
The read complete signal sets the read request signal to OFF after the received data has been read as instructed by the sequence program FROM instruction.
The master module enables the next data to be received by setting the read request signal to OFF.



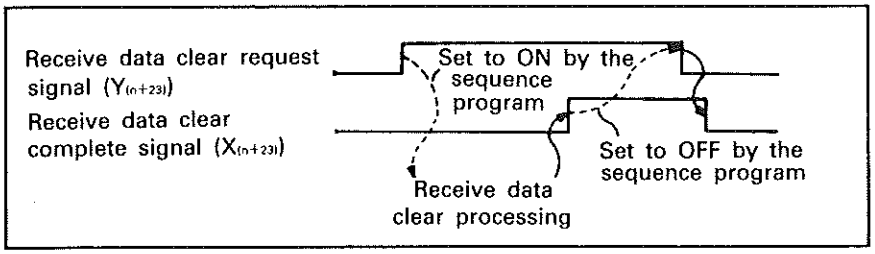
(c) The device numbers used with the read request signal varies with each remote terminal unit number.
The remote terminal unit number is set by the initial data setting of the master module and is assigned to each remote terminal unit.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(13) Receive data clear request signal (I/O dedicated mode: Irrelevant/Extension mode: $Y_{(n+23)}$)

(a) The receive data clear signal clears the contents of the receive data area used by the AJ35PTF-R2.

(b) When receive data clear request signal is set to ON by the sequence program, the AJ35PTF-R2 receive data areas listed below are cleared in accordance with the conditions set in addresses 858 and 859 of the buffer memory.
- Receive data area corresponding to AJ35PTF-R2 of the buffer memory of the master module.
- Receive data area corresponding to the AJ35PTF-R2 of the buffer memory of the master module and the receive data area of the AJ35PTF-R2.

(c) The master module sets the receive data clear complete signal ($X_{(n+23)}$) to on when the receive data clear is completed normally.



(14) Remote terminal unit fault detection reset signal (I/O dedicated mode: Irrelevant/Extension mode: $Y_{(n+24)}$)

(a) The master module sets the remote terminal unit fault detection signal ($X_{(n+24)}$) to ON, when an error is detected during transmission between the master module and a remote terminal unit.

(b) The remote terminal unit fault detection reset signal, which is used to reset the status of the device that detected the error, is set to ON by the sequence program.
When an error is detected during data transmission, the error detection signal should be set to ON after the transmit request signal ($Y_{(n+0)}$ to $Y_{(n+1A)}$) is set to OFF.

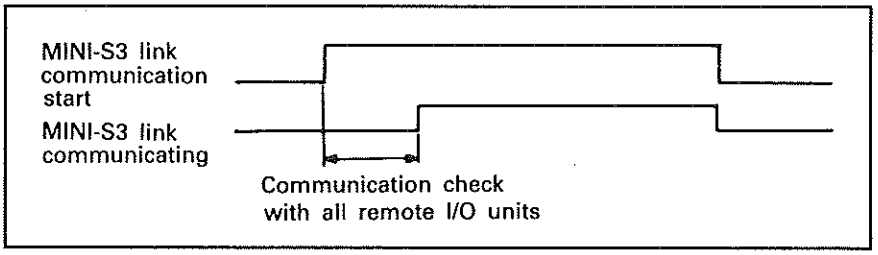
(c) The following processing occurs when the remote terminal unit fault detection signal is set to ON.
- The remote terminal unit fault detection signal ($X_{(n+24)}$) is reset.
- Address 195 of the buffer memory is cleared.

(15) MINI-S3 link communication start (I/O dedicated mode: $X_{(n+18)}$/extension mode: $X_{(n+28)}$)

(a) This signal starts the MINI-S3 link communication processing, and is set to ON by the sequence program.

(b) Setting the MINI-S3 link communication start to ON, initiates I/O refresh by the master module and communication check is performed for all the remote units.
When the communication check ends normally, the master module sets the MINI-S3 link communication-in-progress signal to ON, and communication is performed by all remote units.

(c) When the MINI-S3 link start signal is set to ON, the buffer memory and I/O signals are initialized as indicated below.
- The contents of addresses 70 to 209 and 598 to 855 of the buffer memory are cleared.
- The remote terminal unit error detection signal ($X_{(n+24)}$) is set to OFF.
- The MINI-S3 link error detection signal ($X_{(n+6)}$/$X_{(n+26)}$) is set to OFF.
- The MINI-S3 link communication error signal ($X_{(n+7)}$/$X_{(n+27)}$) is set to OFF.



(16) FROM/TO instruction response designation (I/O dedicated mode: $X_{(n+1A)}$/extension mode: $Y_{(n+2A)}$)

(a) Defines priority of access to the master module buffer memory.
(b) Off indicates that the master module processing has priority.
(c) On indicates that the PC CPU's FROM/TO instruction has priority.
(d) The following processing varies depending on the ON/OFF status of the FROM/TO instruction response designation.

Item \ FROM/TO Instruction Response Designation	OFF	ON
Access to buffer memory	Priority given to master module.	Priority given to PC CPU's FROM/TO instruction.
Receive (input) data read from several stations by one FROM instruction	The receive data refreshed at the same timing can be read.	The receive data refreshed at different timings may be read.
FROM/TO instruction processing time	There is a delay of (0.3ms + 0.2ms × (number of partial refresh stations connected)) max.	No delay

(17) Faulty station data clear designation (I/O dedicated mode: $Y_{(n+1B)}$/extension mode: $Y_{(n+2B)}$)

(a) Specify whether the receive data from a faulty remote I/O station is cleared or not.
(b) $Y_{(n+1B)}$ or $Y_{(n+2B)}$ is independent of the transmission data to a faulty station.

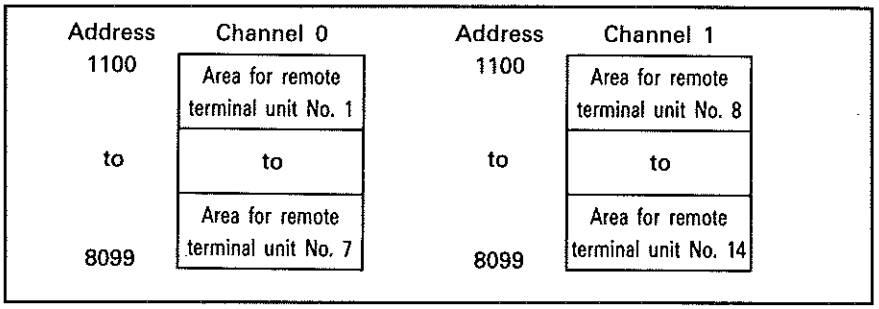
Master Module Buffer Memory \ Faulty Station Data Clear Designation	OFF	ON
Transmission data for batch refresh (addresses 10 to 41)	———	———
Transmission data for batch refresh (addresses 110 to 141)	Data at occurrence of communication error is retained.	All points are switched OFF.
Transmission data for partial refresh (addresses 300 to)	———	———
Transmission data for partial refresh (addresses 600 to)	Data at occurrence of communication error is retained.	All points are switched OFF.

POINT

It is suggested to use no automatic return mode (mode setting switch = 1) when $Y_{(n+1B)}$ or $Y_{(n+2B)}$ is ON.

(18) Buffer memory channel switch signal (I/O dedicated mode: Irrelevant/Extension mode: $Y_{(n+2C)}$)

(a) The buffer memory used when transmitting data between the master module and the remote terminal units differs depending on the channel used.



(b) When data is read or written from the sequence program using the FROM/TO instructions, it is necessary to specify the channel applicable to the area used by the relevant remote terminal unit.

(c) When channel 0 is specified, the FROM/TO instructions are used relevant to remote terminal units No. 1 to No. 7. When channel 1 is specified, the FROM/TO instructions are used relevant to remote terminal units No. 8 to No. 14.

(d) Channel switching takes place in accordance with the ON/OFF state of the channel switch signal.
$Y_{(n+2C)}$ OFF·····Channel 0 is specified.
$Y_{(n+2C)}$ ON·····Channel 1 is specified.

(e) The remote terminal unit number is set by the initial data setting of the master module and is assigned to each remote terminal unit.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(19) Error reset (I/O dedicated mode: $Y_{(n+1D)}$)/extension mode: $Y_{(n+2D)}$)

(a) When the master module detects an error in communication with a remote unit, the MINI-S3 link error detection signal ($X_{(n+6)}/Y_{(n+26)}$) and MINI-S3 link communication error signal ($X_{(n+7)}/Y_{(n+27)}$) are set to ON.

(b) The error reset signal is used to reset the error detected status and is set to ON by the sequence program.
However, the error reset signal is effective only when the start signal ($Y_{(n+18)}/Y_{(n+28)}$) is OFF.

(c) The processing indicated below is performed when the error reset signal is set to ON.
1) The areas of the buffer memory indicated below are cleared.
- Communication error code area (address 107)
- Error detection code area (address 108)
- Remote terminal unit error station detection area (address 195)
- Remote terminal unit error code area (address 196 to 209)

2) The signals indicated below are reset.
- Remote terminal unit error detection signal ($X_{(n+24)}$)
- MINI-S3 link error detection signal ($X_{(n+6)}/Y_{(n+26)}$)
- MINI-S3 link communication error signal ($X_{(n+7)}/Y_{(n+27)}$)

3) The ERR.LEDs indicated below are switched OFF.
- ERR. LOOP LED
- ERR. REM LED

3.10 Buffer Memory

The master module has a buffer memory (not battery backed) for communication of data with the PC CPU.
The FROM/TO instructions are used to read data from the buffer memory to the PC CPU or write data to the buffer memory from the PC CPU.

3.10.1 Buffer memory assignment

Address (Decimal)			Description	Read/Write of PC CPU
0	Number of remote I/O stations	(*2)	Define the remote I/O station range for I/O refresh.	Read/write
1	Number of retries		Define the number of retries at occurrence of communication error.	
	Reserved		—	
4	Line error check		Used to check error location	
	Reserved		—	
10 to 41	Transmission data for batch refresh		Stores data to be output to batch refresh type remote I/O stations.	
	Reserved		—	—
70 to 77	Remote I/O units card data		Stores I/O unit types used as remote I/O stations.	Read only
	Reserved		—	—
90 to 93	Accumulative faulty station detection		Stores faulty station numbers until reset by the sequence program.	Read/write
	Reserved		—	—
100 to 103	Faulty station detection		Stores the most recent faulty station numbers.	Read only
	Reserved		—	
107	Communication error code		Stores the reason why MINI-S3 link error communication error has been switched on.	
108	Error detection code		Latches the ON/OFF state of MINI-S3 link error detection.	
	Reserved			
110 to 141	Receive data for batch refresh		Stores the input data to batch refresh type remote I/O unit.	
	Reserved		—	
160	Line error retry counter		Stores the number of retries made when communication cannot be made with all remote I/O stations due to line error.	
161 to 192	Retry counter		Stores the number of retries made to the faulty station.	
	Reserved		—	
195	Remote terminal unit faulty station	(*1)	Stores the station number when the remote terminal unit error occurs.	
196 to 209	Remote terminal unit error code	(*1)	Stores the cause when the remote terminal unit error detection signal (X (n+24)) is turned on.	
	Reserved		—	—
250 to 282	Partial refresh station	(*2)	Write the partial refresh type remote I/O unit numbers and the numbers of digits specified (numbers of partial refresh times).	Read/write
	Reserved		—	
300 to 555	Transmission data for partial refresh		Stores data output to batch refresh type remote I/O units.	
	Reserved		—	
598	Accumulative input error detection for partial refresh		Holds the partial refresh input data receive error until reset by the sequence program.	
599	Input faulty station detection for partial refresh		Stores the partial refresh input data receive error.	
600 to 855	Receive data for partial refresh		Stores input data to partial refresh type remote I/O units.	Read only

Address (Decimal)			Description	Read/Write of PC CPU
858	Receive data clear specification	(*1)	Specifies the station number of the AJ71PTF-R2 that clears receive data using the receive data clear request signal ($Y_{(n+23)}$).	Read/write
859	Receive data clear area specification	(*1)	Specifies the receive buffer that is to be cleared when the receive data is cleared by the receive data clear request signal ($Y_{(n+23)}$).	
860 to 929	Parameters for no-protocol mode	(*1)	Specifies the parameters to be used when in the AJ71PTF-R2 no-protocol mode.	
930 to 1099	Reserved		—	—

Address (Decimal)	(*3) Channel 0	(*3) Channel 1		Description	Read/Write of PC CPU
1100 to 2099	Transmission/receive area for remote terminal unit No. 1	Transmission/receive area for remote terminal unit No. 8	(*1)	Writes transmission data to a remote terminal unit or stores receive data from a remote terminal unit.	Read/write
2100 to 3099	Transmission/receive area for remote terminal unit No. 2	Transmission/receive area for remote terminal unit No. 9			
3100 to 4099	Transmission/receive area for remote terminal unit No. 3	Transmission/receive area for remote terminal unit No. 10			
4100 to 5099	Transmission/receive area for remote terminal unit No. 4	Transmission/receive area for remote terminal unit No. 11			
5100 to 6099	Transmission/receive area for remote terminal unit No. 5	Transmission/receive area for remote terminal unit No. 12			
6100 to 7099	Transmission/receive area for remote terminal unit No. 6	Transmission/receive area for remote terminal unit No. 13			
7100 to 8099	Transmission/receive area for remote terminal unit No. 7	Transmission/receive area for remote terminal unit No. 14			
	($Y_{(n+2C)}$ ··· OFF)	($Y_{(n+2C)}$ ··· ON)			

POINT

(1) The *1 area is used only when the master module is in the extension mode. (It is not used in the I/O dedicated mode.)

(2) The *2 area does not need to be specified when the master module is in the extension mode. (The contents of the initial data ROM are automatically stored here.)

(3) The *3 channel is used to perform read and write operations for addresses 1100 to 8099 and is switched by the channel switch signal ($Y_{(n+2C)}$).

(4) When power is turned on or the PC CPU is reset, all areas of the buffer memory are cleared (set to 0).
However, for the number of retries (address 1) and the parameters for the no-protocol mode (addresses 860 to 929), the default values are set.

(5) Do not write from the PC CPU to the read-only areas.

(6) The reserved areas are used by the master module system.

(7) Data in the read-only areas including the reserved areas can be read from the PC CPU sequentially, e.g. data can be read from the accumulative faulty station detection (addresses 90 to 93) and faulty station detection (addresses 100 to 103) areas by using a single FROM instruction.

3.10.2 Buffer memory and data location

(1) Total number of remote I/O stations (address 0)

(a) Define the remote I/O unit range for I/O refresh.
(b) I/O refresh is performed for up to the remote I/O unit specified in address 0.
For example, remote I/O units 1 to 20 are refreshed when 20 is set to address 0. Remote units of address 21 and on are not refreshed.
(c) Specify the last remote I/O unit number connected to the master module.
The value specified should include the number of occupied stations if the last remote I/O unit occupies two or more stations. That is, set 13 to address 0 to allow data link for up to station 10 that occupies 4 stations.
(d) Default value is 0.
(e) Any value between 1 and 64 may be specified. Any value set outside this range flags an initial data error when the MINI-S3 link communication start signal ($Y_{(n+18)}$ / $Y_{(n+28)}$) is switched on.
(f) The number of remote I/O stations should be written to address 0 with the MINI-S3 link communication start signal OFF because the value active at the leading edge of the MINI-S3 link communication signal is valid.
(g) This address does not need to be specified by the sequence program when the master module is used in the extension mode. (Sequence program specified settings are ignored.)
The settings for the total number of remote stations in the extension mode is set by the initial data ROM or the SW□GP-MINIP type system floppy disk.
When power is applied to the PC or when it is reset, the specified contents of the initial data ROM is automatically read to this area.
For further information concerning the methods of specifying the total number of remote stations in the extension mode, see the SW□GP-MINIP Operating Manual.

(2) Number of retries (address 1)

(a) Define the number of retries made to the faulty remote I/O unit.
(b) Default value is 5.
(c) Any value between 0 and 32 may be specified.
(d) The number of retries should be written to address 1 when the MINI-S3 link communication start signal ($Y_{(n+18)}$ / $Y_{(n+28)}$) is OFF because the value active at the leading edge of the MINI-S3 link communication start signal is valid.
(e) A communication error occurs if the faulty remote I/O unit cannot be restored after retry is made the specified number of times.

(3) Line error check (address 4)

(a) The line error check setting aids in locating line faults by lighting the remote unit RUN LED lamps up to the location where the fault has occurred.
Although faults can be located with the RD/SD LEDs with the line check function provided by the operation mode switch ON the front panel of the master module, units such as the operation box which is not equipped with RD/SD LEDs cannot be checked using this function.
Because the line error check locates the faulty unit using the RUN LED, it can be used for all units.

(b) The line error check forces the output of OFF data or the value of data that existed directly prior to the fault occurring of each of the remote units to turn ON the RUN LED. (If no line error has occurred, normal data is output.)

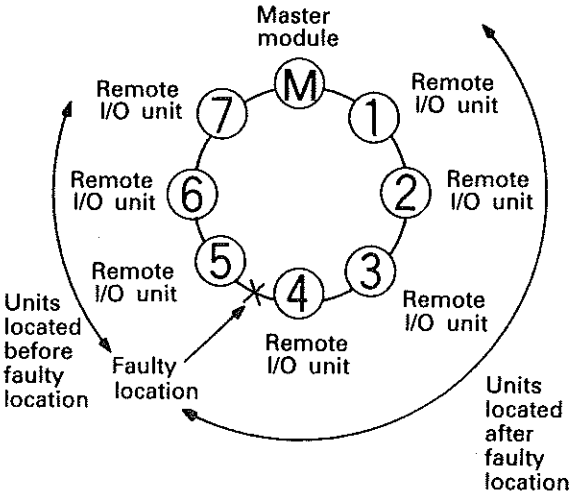
POINT

When a line error check is performed, the E.C. mode setting of the output remote I/O units is no longer effective as the data is output forcibly to each of the remote units.
Note that this means that the output status set by the E.C. mode setting at the point the error occurred is changed by the line error check.

(c) The line error check is performed by either a "1" or "2" being set in buffer memory address 4.
The value becomes effective when the communication start signal ($Y_{(n+18)}$ / $Y_{(n+28)}$) is set from OFF to ON.
0: Normal data link operations
1: Outputs off data, and line error check is performed
2: The value of data that existed directly prior to the fault occurring is output, and line error check is performed.

(d) The value of line error check settings and the output status to each of the output remote I/O units is indicated below.

Operation Mode Switch (located on front panel of master module)	Line Error Check Setting (buffer memory address 4)	Output Status of the Remote I/O Units			
		Units located before faulty location		Units located after faulty location	
		E.C. mode setting ON	E.C. mode setting OFF	E.C. mode setting ON	E.C. mode setting OFF
0	0	All output points are switched OFF	The data existing directly prior to the fault occurring is retained.	All output points are switched OFF	The data existing directly prior to the fault occurring is retained.
	1	All output points are switched off			
	2	The data existing directly prior to the fault occurring is retained.			
1, 2	0	All output points are switched OFF	The data existing directly prior to the fault occurring is retained.		
	1, 2	All output points are switched OFF			

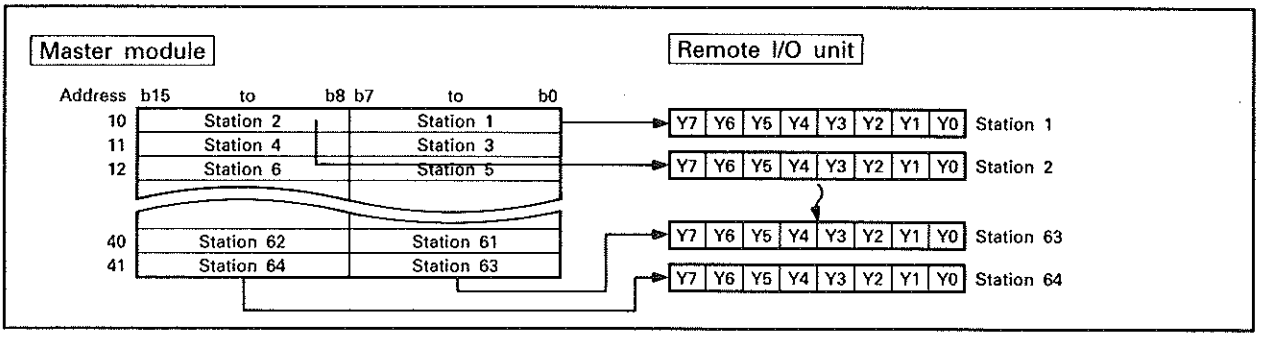


(e) The output data (the data which uses the transmit area (addresses 1100 to 8099) for the remote terminal unit) corresponding to the remote terminal unit retains output data regardless of the setting of the line error check.

(4) Transmission data for batch refresh (addresses 10 to 41)

(a) Set the data to be output to the batch refresh type remote I/O unit.

(b) Batch refresh transmission data area assignment is as follows: Addresses where the transmission data is to be written vary according to the station number assigned to each individual remote I/O units.



(c) Batch refresh transmission data area is made up of 8 bits per remote I/O station as shown below.

bn+7	bn+6	bn+5	bn+4	bn+3	bn+2	bn+1	bn+0
Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0

1: ON
0: OFF

*: Value "n" depends on the remote I/O station number.
b0 to b7 for odd-numbered stations 1, 3 ····· 63
b8 to b15 for even-numbered stations 2, 4 ····· 64

(5) Remote I/O unit card data (addresses 70 to 77)

(a) Stores the card data of the remote I/O units linked to MINI-S3.
(b) There are three types of card data which is expressed in two bits.
00: Indicates that there is no remote I/O unit or the unit could not make initial communication.
01: Indicates an input remote I/O unit.
Indicates a partial refresh type remote I/O unit
Indicates a remote terminal unit
10: Indicates an output remote I/O unit.
(c) Data is made up as indicated below:

Address	b15 b14	b13 b12	b11 b10	b9 b8	b7 b6	b5 b4	b3 b2	b1 b0
70	Station 8	Station 7	Station 6	Station 5	Station 4	Station 3	Station 2	Station 1
71	Station 16	Station 15	Station 14	Station 13	Station 12	Station 11	Station 10	Station 9
	Station 24	Station 23	Station 22	Station 21	Station 20	Station 19	Station 18	Station 17
76	Station 56	Station 55	Station 54	Station 53	Station 52	Station 51	Station 50	Station 49
77	Station 64	Station 63	Station 62	Station 61	Station 60	Station 59	Station 58	Station 57

(d) Remote I/O station card data is processed only once when the MINI-S3 link communication start signal ($Y_{(n+18)}$ / $Y_{(n+28)}$) is turned from OFF to ON.

(6) Accumulative faulty station detection (addresses 90 to 93)

(a) The station number of the faulty remote I/O unit is detected.
(b) Sets "1" to the bit corresponding to the faulty remote I/O station when a communication error occurs.
(c) The corresponding bit is not reset to 0 if the faulty station is restored. Addresses 90 to 93 indicate accumulative faulty stations indicated in the faulty station detection area (addresses 100 to 103).
(d) Reset to 0 when the MINI-S3 link communication start signal ($Y_{(n+18)}$ / $Y_{(n+28)}$) is turned from OFF to ON.
(e) The data configuration is as indicated below:

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

1: Error
0: Normal

(7) Faulty station detection (addresses 100 to 103)

(a) The station number of the faulty remote I/O unit is detected.
(b) Sets "1" to the bit corresponding to the faulty I/O station if correct communication is impossible after the retry of the specified number (address) of retries after an occurrence of communication error.
(c) In the automatic return mode, the corresponding bit is reset to "0" when the faulty station is restored.
In the no-automatic return mode, the corresponding bit remains "1".
(d) Any faulty station is detected when the MINI-S3 link communication start signal ($Y_{(n+18)}$ / $Y_{(n+28)}$) is on. Data is retained when the MINI-S3 link communication start signal is OFF.
(e) The data configuration is as indicated below:

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

1: Error
0: Normal

(8) Communication error code (address 107)

(a) Stores the corresponding error code when the MINI-S3 link communication error signal ($Y_{(n+7)}$ / $Y_{(n+27)}$) is turned ON.
(b) Communication error codes are as follows:

Code	Definition	Cause
0	No error	———
1	Initial data error	Any of the following settings is wrong: • Total number of remote stations • Number of retries • Partial refresh stations • Line error check • No-protocol mode parameters
2	Line error	A link cable is broken or a remote I/O unit power is OFF.
3	Station fault	Communication has stopped due to a station fault with the communication stop (C-S mode) mode specified for fault detection.
4	Partial refresh type remote I/O unit fault	Communication has stopped due to occurrence of input error of the partial refresh type remote I/O unit with the communication stop (C-S mode) mode specified for fault detection.

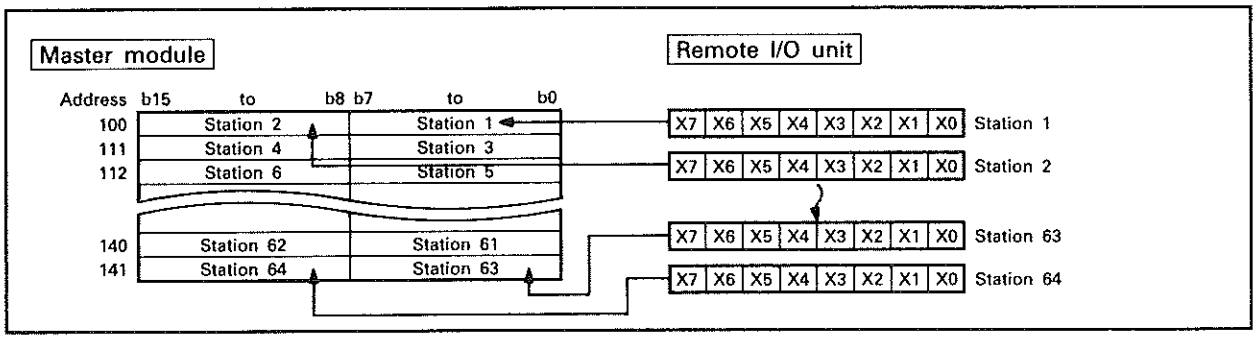
(c) The communication error code is reset to 0 in the following cases:
• The error reset signal ($Y_{(N+1D)}$ / $Y_{(n+2D)}$) is turned ON when the communication start signal ($Y_{(n+18)}$ / $Y_{(n+28)}$) is OFF.
• The communication start signal is turned from OFF to ON.

(9) Error detection code (address 108)

(a) "1" indicates that the MINI-S3 link error detection signal ($X_{(n+6)}$ / $X_{(n+26)}$) has been turned ON. "0" indicates normal.
(b) In the automatic return mode (mode setting switch = 0), the error detection code remains "1" but the MINI-S3 link error detection signal is switched OFF when communication is restored.
(c) The error detection code is reset to 0 in the following cases:
- The error reset signal ($Y_{(n+1D)}$ / $Y_{(n+2D)}$) is turned ON when the communication start signal ($Y_{(n+18)}$ / $Y_{(n+28)}$) is OFF.
- The communication start signal is turned from OFF to ON.

(10) Receive data for batch refresh (addresses 110 to 141)

(a) Stores input from the batch refresh type remote I/O units.
(b) Receive data area assignment for batch refresh is as indicated below.
The storage address for the receive data varies depending on the station number assigned to each remote unit.



(c) Batch refresh receive data area is made up of 8 bits per remote I/O station as shown below.

bn+7	bn+6	bn+5	bn+4	bn+3	bn+2	bn+1	bn+0
X7	X6	X5	X4	X3	X2	X1	X0

1: ON
0: OFF

*: Value "n" depends on the remote I/O station number.
b0 to b7 for odd-numbered stations 1, 3 ····· 63
b8 to b15 for even-numbered stations 2, 4 ····· 64

(11) Line error retry counter (address 160)

(a) Stores the number of retry times after a line error has occurred.
(b) Reset to 0 when communication is restored.
(c) Stores the value from address 1 (number of retries) when the MINI-S3 link communication error signal ($X_{(n+7)}$ / $X_{(n+27)}$) is turned ON.

(12) Retry counter (addresses 161 to 192)

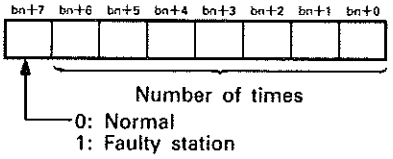
(a) Receives the number of retries made to the faulty remote I/O unit.

(b) Reset to 0 when communication is restored.

(c) Buffer memory assignment is as indicated below:

Address	b15 to b8	b7 to b0
161	Station 2	Station 1
162	Station 4	Station 3
163	Station 6	Station 5
191	Station 62	Station 61
192	Station 64	Station 63

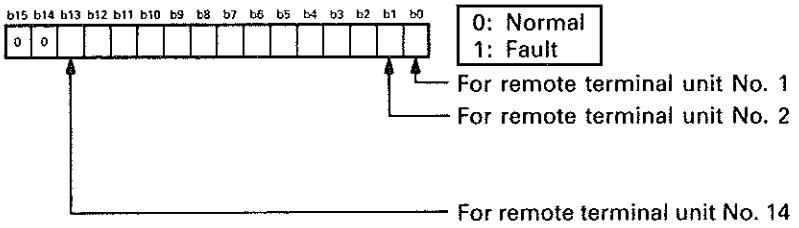
(d) The retry counter area has 8 bit locations per remote I/O station as shown below:



*: Value "n" depends on the remote I/O station number.
b0 to b7 for odd-numbered stations 1, 3 ····· 63
b8 to b15 for even-numbered stations 2, 4 ····· 64

(13) Remote terminal unit faulty station (address 195)

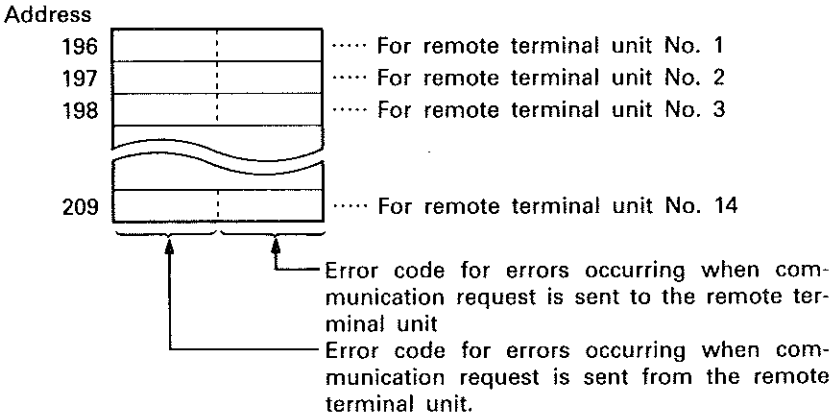
(a) The unit number of the faulty remote terminal unit is detected.
(b) The table in section 6.2 provides a list of possible causes of faults.
(c) When a fault is detected the remote terminal unit fault signal ($X_{(n+24)}$) is set to on and the bit corresponding to the faulty remote terminal unit is set.
(d) Setting the remote terminal unit faulty station detect from OFF to ON resets the remote terminal unit faulty station bit.
If a fault is detected during data transmission, turn the transmit request signal ($Y_{(n+0)}$ to $Y_{(n+1A)}$) to OFF prior to resetting the remote terminal unit faulty station bit.
(e) A fault is detected when the communication request signal is ON.
Data is retained when the communication request signal is OFF.
(f) The correspondence between the remote terminal unit numbers and bits is indicated below.



(g) The remote terminal unit number is assigned to each remote terminal unit by the setting of the initial data in the master module.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(14) Remote terminal unit error code (addresses 196 to 209)

(a) When the remote terminal unit fault detection signal ($X_{(n+24)}$) is set to on, the error contents is stored as code in the address relevant to the remote terminal unit number.
(b) For further information concerning error code, see Section 6.2.



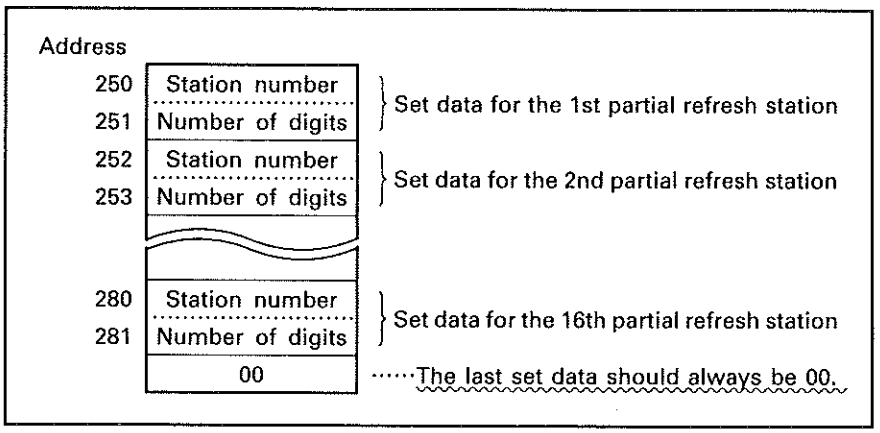
(c) The remote terminal unit number is assigned to each remote terminal unit by the setting of the initial data in the master module.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(d) The error code is reset when the error reset signal ($Y_{(n+28)}$) is set to on when the communication start signal ($Y_{(n+2D)}$) is off. "0" is also stored in the bit when the communication start signal is set from OFF to ON.

(15) Partial refresh station (addresses 250 to 282)

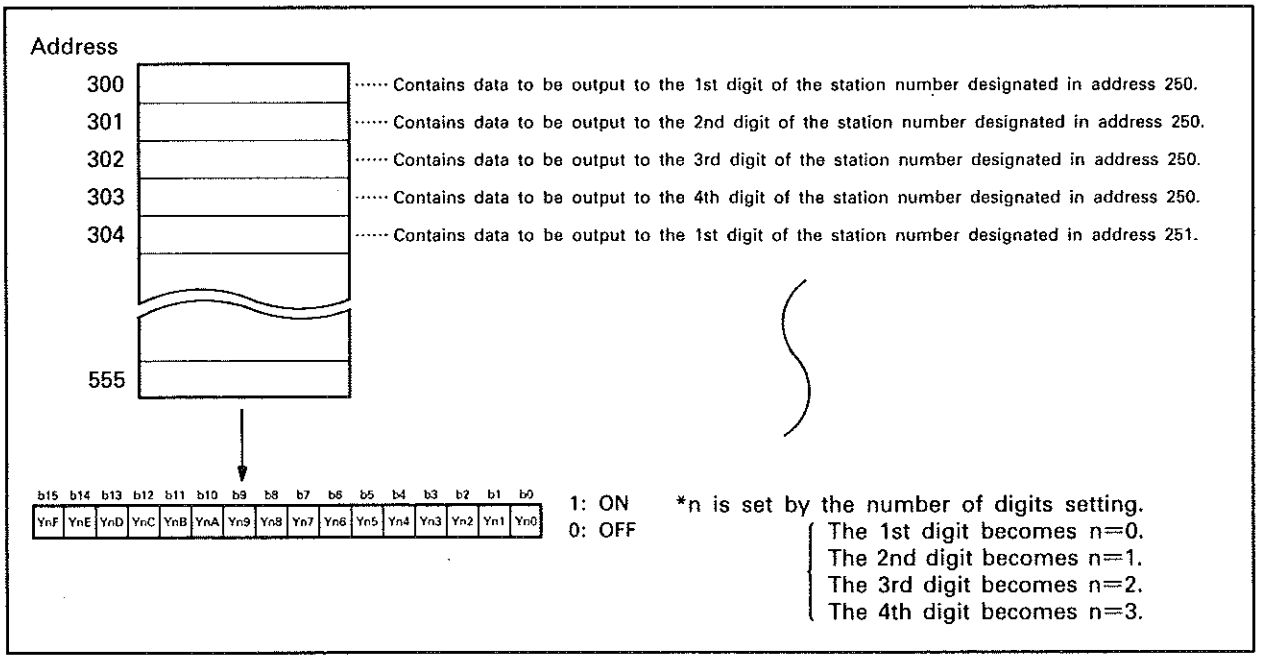
(a) This set data is used to use partial refresh type remote I/O unit, and designates station numbers and the number of digits, which is derived from either the number of inputs or outputs divided by 16 points.
For further information concerning the method to set the data, see AJ35PTF-128DT Partial Refresh Type Remote I/O Unit User's Manual.

(b) This address does not need to be specified by the sequence program when the master module is used in the extension mode. (Sequence program specified settings are ineffective.)
The settings for the total number of partial refresh stations in the extension mode is set by the initial data ROM which is set in turn by the SW□GP-MINIP type system FD.
When power is applied to the PC power supply or when a reset operation performed, the specified contents of the initial data ROM is automatically read to the corresponding area.
For further information concerning for the methods of specifying the partial refresh stations in the extension mode, see the SW□GP-MINIP Operating Manual.



(16) Transmission data for partial refresh (address 300 to 555)

Designate data to be output to partial refresh type remote I/O unit. The buffer memory assignment is specified by the setting of the partial refresh station (addresses 250 to 282). For further information, see AJ35PTF-128DT Partial Refresh Type Remote I/O Unit User's Manual.



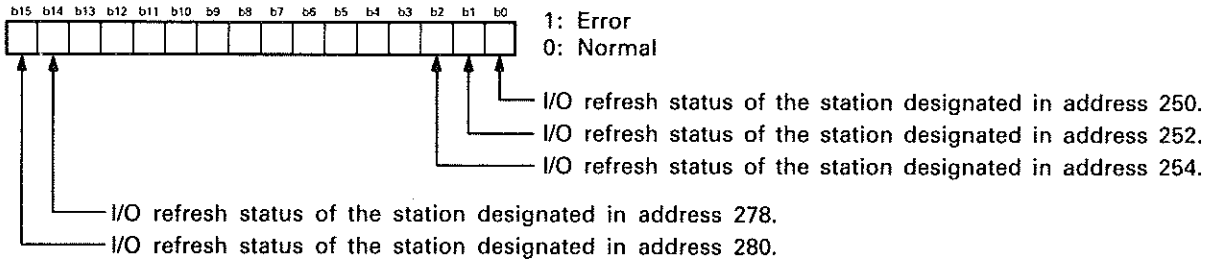
(17) Accumulative input error station detection for partial refresh (address 598)

(a) Contains I/O refresh status of partial refresh type remote I/O unit.
When the input data cannot be read within a set period, the corresponding bit is set.

(b) When the faulty input station is restored, the bit corresponding to the station cannot be reset.
the accumulative result of the error stations detected in the input error station detection (address 599), is set for this bit.

(c) Accumulative input error station detection is reset to 0 when the MINI-S3 link communication start ($Y_{(n+18)}$ / $Y_{(n+28)}$) is set from OFF to ON.

(d) The buffer memory contains the data indicated below.
The storage area of the error data contents for each station is determined by the settings of the partial refresh station.

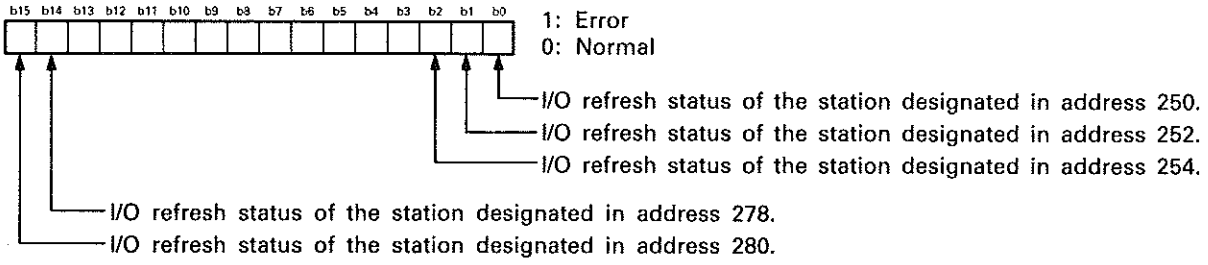


(18) Input error station detection for partial refresh (address 599)

(a) Contains I/O refresh status of partial refresh type remote I/O unit.
When the input data cannot be read within a set period, the corresponding bit is set.

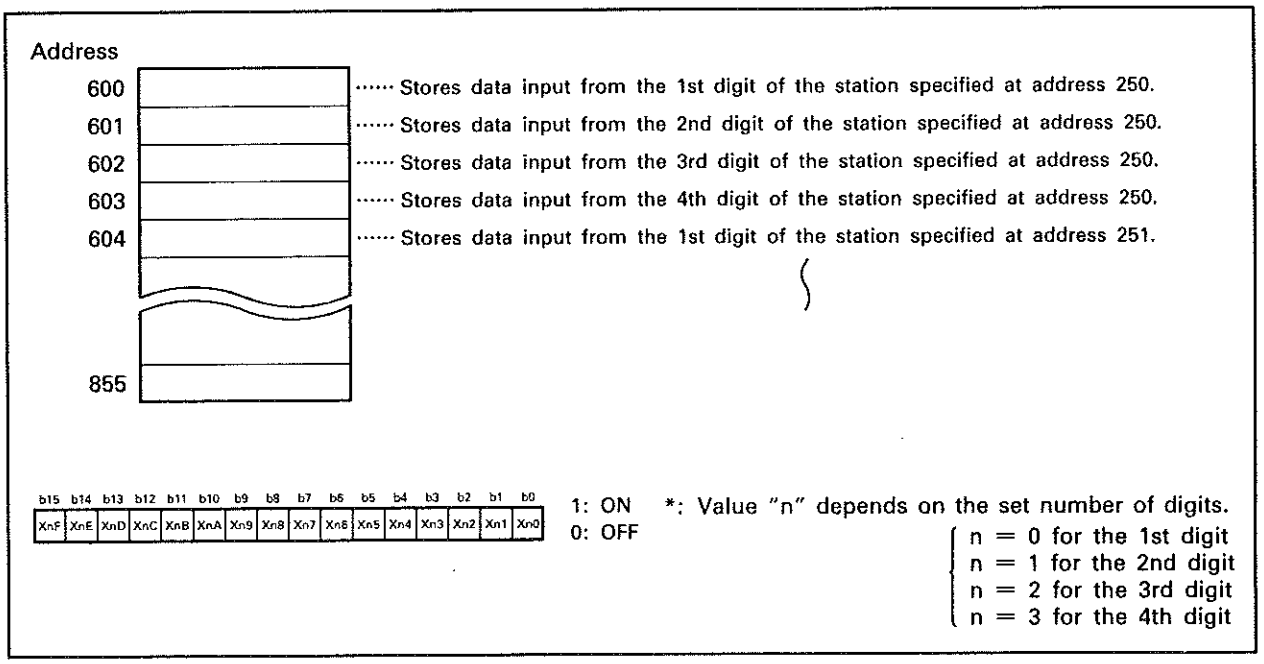
(b) When the faulty input station is restored and the automatic return function is set ON, the bit corresponding to the station with the input error is reset.
If the automatic return function is OFF, the bit is not reset.

(c) The buffer memory contains the data indicated below.
The storage area of the error data contents for each station is determined by the settings of the partial refresh station.



(19) Receive data for partial refresh (addresses 600 to 855)

The data input from the AJ35PTF-128DT is stored in the area corresponding to those addresses.
The buffer memory assignment is specified by the setting of the partial refresh station (addresses 250 to 282).
(For further information, see Section 4.1.1.)



(20) Receive data clear designation (address 858)

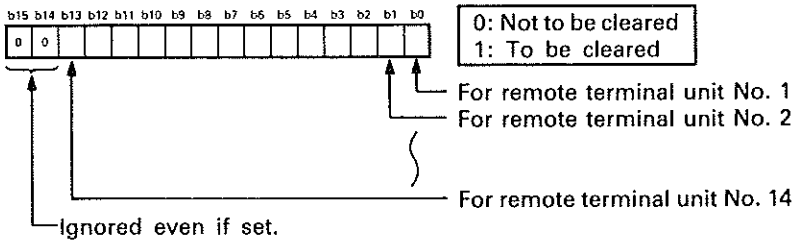
(a) The receive data clear designation specifies the AJ35PTF-R2 remote terminal unit number, the receive buffer of which is to be cleared by the receive data clear request signal ($Y_{(n+23)}$).

(b) The receive buffer is cleared to empty the receive buffer of error-causing data received from faulty external device connected to an AJ35PTF-R2.

(c) Two receive buffers can be cleared using the receive data clear designation, one for the remote terminal unit in the master module, and one for the AJ35PTF-R2. This is specified using the receive data clear range designation (address 859).

(d) The buffer memory of remote terminal unit to be cleared is specified by setting "1" in the bit corresponding to the remote terminal unit number that is assigned to the relevant AJ35PTF-R2.
Setting for a remote terminal unit other than AJ35PTF-R2 is ignored.

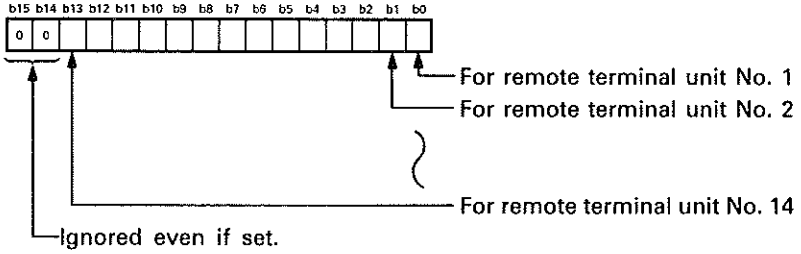
(e) The correspondence between the remote terminal unit numbers and bits is indicated below.



(f) The remote terminal unit number is assigned to each remote terminal unit by the setting of the initial data in the master module.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(21) Receive data clear range designated (address 859)

(a) The receive data clear range designation specifies the area of receive buffer corresponding to the relevant AJ35PTF-R2 that is to be cleared by the receive data clear request signal ($Y_{(n+23)}$).
(b) The receive data clear range designation specifies whether only the receive buffer for the remote terminal unit in the master module corresponding to the AJ35PTF-R2 is to be cleared, or if this area and the communication receive buffer for device external to the AJ35PTF-R2 is to be cleared simultaneously as well.
(c) The receive data clear range designation is effective only for AJ35PTF-R2s that are specified in the receive data clear designation (address 858).
(Receive data clear range designation for AJ35PTF-R2s that are not specified in the receive data clear designation is ignored.)
(d) Whether only the receive buffer assigned to the AJ35PTF-R2 is to be cleared or whether that and the communication receive buffer of the AJ35PTF-R2 are to be cleared is specified as indicated below.
0: Clears only the receive buffer for the remote terminal unit in the master module.
1: Clears the receive buffer for the remote terminal unit in the master module and the receive buffer of the AJ35PTF-R2.
(e) The correspondence between the remote terminal unit numbers and bits is indicated below.



(f) The remote terminal unit number is assigned to each remote terminal unit by the setting of the initial data in the master module.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(22) No-protocol mode parameters (addresses 860 to 929)

(a) Set the parameters for AJ35PTF-R2 to use it in the no-protocol mode.

(b) The three types of settings are indicated below.

1) Byte/word setting:
Sets whether communication is conducted in bytes or word units.

2) Receive termination code setting:
Sets the user-defined code specifying the termination of receive data.

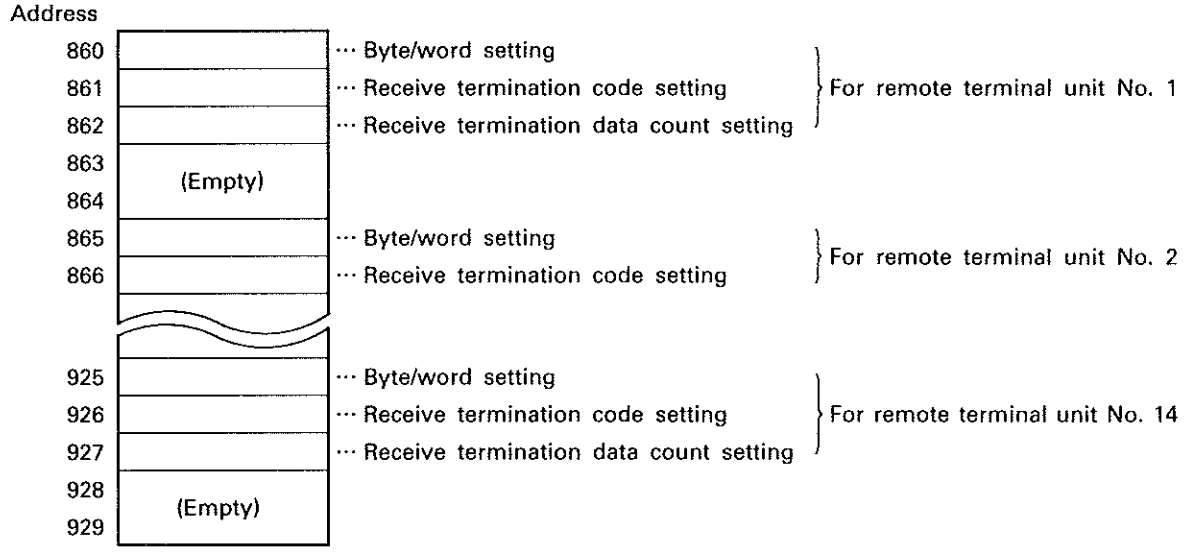
3) Receive termination data count setting:
Designates the termination of data receive using data count.

(c) For further information concerning the setting of parameter areas for the no-protocol mode, see the AJ35PTF-R2 RS-232C Interface Unit User's Manual.

(d) Parameters should be written when the MINI-S3 link communication start signal ($Y_{(n+28)}$) is set to OFF.
The parameter values become effective when the MINI-S3 link communication start signal is set from OFF to ON.

(e) The following values are contained when power is applied to the system.
Byte/word setting: 0 (word)
Receive termination code setting: $0D0A_H$
Receive termination data count setting:
(Receive area word count for a remote terminal unit) — 1

(f) Assignment of parameter areas for the no-protocol mode is indicated below.

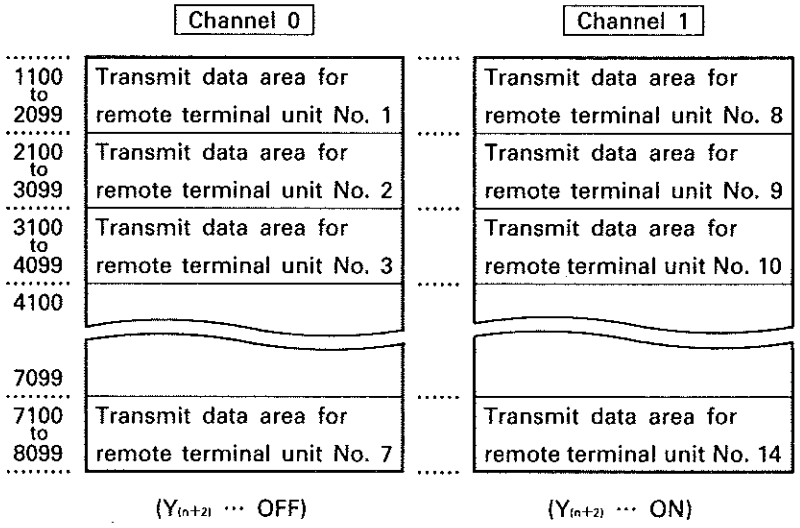


(g) The remote terminal unit number is assigned to each remote terminal unit by the setting of the initial data in the master module.
Set the parameters to the areas for the unit number assigned to the AJ35PTF-R2 which uses the no-protocol mode.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(23) Remote terminal unit communication area (addresses 1100 to 8099)

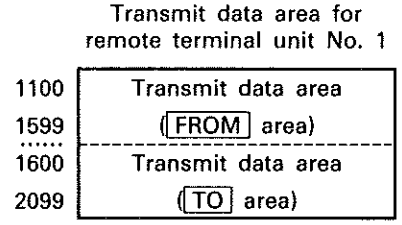
(a) The remote terminal unit communication area is used for communication of data between the master module and remote terminal units.

(b) The channels for the communication data area varies between remote terminal units numbers 1 to 7 and 8 to 14.
The two channels are switched depending on which remote terminal units the data is being written to or read from using the FROM / TO instructions.
The channel switch signal ($Y_{(n+2C)}$) is used to specify the channel to be used.



The remote terminal unit number is assigned to each remote terminal unit by the setting of the initial data in the master module.
Data read and write is conducted in the areas corresponding to the remote terminal unit numbers assigned to each of the remote terminal units.
For further information concerning remote terminal unit numbers, see Section 3.6 (4).

(c) Each communication data area is configured of a transmission data area and a receive area as indicated below. The amount of data that each area can contain when power is applied to the system is 500 words.



Transmit data area is area used to set the data transmitted to the remote terminal unit.
Receive data area is area used to contain the data received from the remote terminal unit.

(d) Data storing capacity of each area can be freely specified by the initial data settings of the master module.
(The total maximum number of words that may be specified is 1000, e.g., the transmission data area plus receive data area must not exceed 1000 words.)
Example) Receive data area: 200 words
Transmit data area: 800 words
For further information concerning initial data settings, see the SW□GP-MINIP Operating Manual.

(e) For further information concerning the setting of data transmitted to the transmission data area or the data contained in the receive data area, see the user's manuals for the appropriate remote terminal unit.

4. SPECIFICATIONS

4.1 General Specifications

<table>
<tr><th>Item</th><th colspan="5">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="5">0 to 55℃</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="5">−20 to 75℃</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="5">10 to 90%RH, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="5">10 to 90%RH, non-condensing</td></tr>
<tr><td rowspan="3">Vibration resistance</td><td rowspan="3">Conforms to *JIS C 0911</td><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep Count</td></tr>
<tr><td>10 to 55Hz</td><td>——</td><td>0.075mm (0.003inch)</td><td rowspan="2">10 times *(1 octave/minute)</td></tr>
<tr><td>55 to 150Hz</td><td>1g</td><td>——</td></tr>
<tr><td>Shock resistance</td><td colspan="5">Conforms to *JIS C 0912 (10g × 3 times in 3 directions)</td></tr>
<tr><td>Noise durability</td><td colspan="5">By noise simulator of 1500Vpp noise voltage,
1 μs noise width and 25 to 60Hz noise frequency</td></tr>
<tr><td>Dielectric withstand voltage</td><td colspan="5">1500V AC for 1 minute across AC external terminals and ground
500V AC for 1 minute across DC external terminals and ground</td></tr>
<tr><td>Insulation resistance</td><td colspan="5">5MΩ or larger by 500V DC insulation resistance tester across
AC external terminals and ground</td></tr>
<tr><td>Grounding</td><td colspan="5">Class 3 grounding; grounding is not required when it is impossible.</td></tr>
<tr><td>Operating ambience</td><td colspan="5">Free of corrosive gases. Dust should be minimal.</td></tr>
<tr><td>Cooling method</td><td colspan="5">Self-cooling</td></tr>
</table>

Table 4.1 General Specifications

REMARKS

One octave marked * indicates a change from the initial frequency to double or half frequency. For example, any of the changes from 10Hz to 20Hz, from 20Hz to 40Hz, from 40Hz to 20Hz, and 20Hz to 10Hz are referred to as one octave.

*JIS: Japanese Industrial Standard

4.2 Performance Specifications

4.2.1 Performance specifications

		AJ71PT32-S3		Remarks
		Optical Data Link	Twisted Pair Data Link	
For one master module	Max. number of link stations	64		No limit to the number of master modules used.
	Input (points)	512		Number of input/output points = 8 per remote I/O station. Total number of input + output points = 512.
	Output (points)	512		
I/O refresh time (ms)		3.2 to 18 *1 (when 64 stations are connected)		
Communication speed (BPS)		1.5M		
Optical transmission level (dB)		−14.4 to −11.6	- -	
Optical receive level (dB)		−30 to −14	----	
Optical wave length (mm)		660 (Visible radiation)	——	
Max. interstation transmission distance (m/ft)		1 to 50/3.28 to 164*3	1 to 100/3.28 to 328 (50/164)*2	No limit overall distance.
Number of I/O points occupied		I/O dedicated mode: 32 Extension mode: 48		Will be changed by the setting of mode switching jumper pins.
5V DC internal current consumption (A)		0.35		
Weight kg (lb)		0.6 (1.32)		

(1) Max. number of link stations per master module

Indicates that the total number of occupied stations assigned to the remote I/O units is up to 64 stations.
For example, up to 8 compact remote I/O units (AJ35PTF-56DT which occupies 8 stations) can be connected.
The allowable maximum number of remote terminal units (occupying 4 stations) is 14.
For the number of stations occupied by each type of the remote terminal units, see the appropriate remote unit user's manual.

(2) Max. number of link points per master module

Depends on the type of remote I/O unit connected.

Example 1: If 8 compact remote I/O units (AJ35PTF-56DT which occupies 8 stations) are used, 256 input and 192 output points can be controlled.

Example 2: If 16 partial refresh type remote I/O units (AJ35PTF-128DT which occupies 4 stations) are used, 1024 input and 1024 output points can be controlled.

REMARKS

Use of the partial refresh type remote I/O unit increases the maximum number of link points per master module but makes the I/O response time longer than the batch refresh type remote I/O unit, e.g. the response time of the AJ35PTF-128DT is 107ms max. for input and 21.5ms for output.

POINT

***1: The I/O refresh time is determined by the number of remote units connected in the system, their types, and the setting of the operation mode switch of the master module as indicated below.**

R: Total number of remote stations
B: Number of AJ35PTF-128DT units connected
T: Number of remote terminal units connected

Mode Setting	Operation Mode Switch	I/O Refresh Time (msec)
I/O dedicated mode	Online automatic return (0)	I/O refresh time = 0.48 + (0.042×R) + (0.2×B)
	Online no-automatic return (1)	I/O refresh time = 0.46 + (0.053×R) + (0.2×B)
	Communication stop when error is detected (2)	I/O refresh time = 0.44 + (0.046×R) + (0.2×B)
Extension mode	Online automatic return (0)	I/O refresh time = 0.66 + (0.044×R) + (0.25×B) + (0.95×T)
	Online no-automatic return (1)	I/O refresh time = 0.54 + (0.058×R) + (0.25×B) + (0.95×T)
	Communication stop when error is detected (2)	I/O refresh time = 0.54 + (0.051×R) + (0.25×B) + (0.95×T)

***2: The maximum inter-station transmission distance depends on the twisted-pair cable diameter as follows:**

0.2mm² (0.00031in²) to less than 0.5mm² (0.00077in²) ····· 50m (164ft)
0.5mm² (0.00077in²) or more ····· 100m (328ft)

***3: The inter-station transmission distance of the optical fiber cable is between 1m (3.28ft) and 50m (164ft). Normal communication cannot be guaranteed for distances less than 1m (3.28ft).**
Assembling method of optical fiber cable differs depending on cable length; 1m (3.28ft) to less than 5m (16.4ft), or 5m (16.4ft) or more.
For details, refer to Appendix 2.

4.3 Optical Fiber Cable Specifications

Item	Specifications
Applicable optical cable	Plastic fiber cable
Cable transmission loss	260 dB/km (853 dB/kft)
Optical fiber OD	1000 μm
Connector	1-core connector
Minimum allowable bend radius*	25mm(0.98inch) max.*

Table 4.2 Optical Fiber Cable Specifications

*: Applies to the stand-alone remote I/O units which are wired inside the casing.

The following optical fiber cables available from Mitsubishi conform to the specifications in Table 4.2:

Type	Remarks
M-2P-□M-A	PVC coated core cable (standard cable for indoor use, conforming to UL standard) Cable diameter 2.2mm(0.09inch)
M-2P-□M-B	Reinforced PVC coated core cable (reinforced cable for indoor use) Cable diameter 5.0mm(0.20inch)
M-2P-□M-C	PE coated core cable (standard cable for indoor use) Cable diameter 2.2mm(0.09inch)

Table 4.3 Optical Fiber Cables

Enter the cable length (m) required in □.

Example: PVC coated core cable of 40m(131ft) length

M-2P-40M-A

4.4 Twisted Pair Cable Specifications

Item	Specifications
Cable type	Twisted pair shielded cable
Number of pins	2 or more pins
Conductor resistance (20°C)	88.0Ω/km max.
Electrostatic capacity (1kHz)	60nF/km(197nF/kft) max. on average
Characteristic impedance (100kHz)	110 ± 10Ω

Table 4.4 Twisted Pair Cable Specifications

5. PRE-OPERATION SETTING AND PROCEDURE

5.1 Master Module Handling Instructions

(1) Do not subject to the master module to impact or shock.

(2) Do not remove printed circuit boards from the housing. There are no user-serviceable parts on the boards.

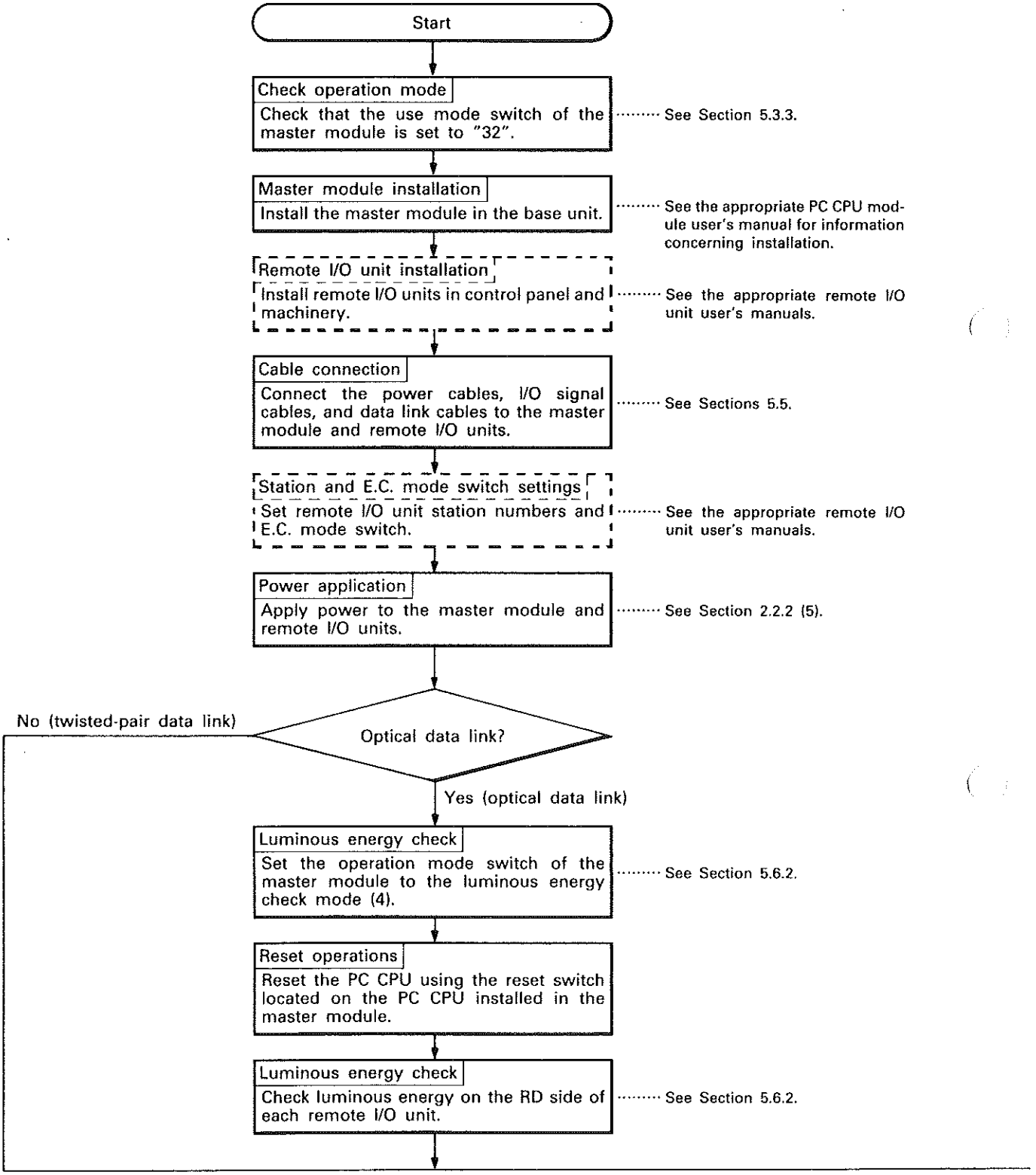
(3) Ensure that no conductive debris can enter the module. If it does, make sure that it is removed. Guard particularly against wire offcuts.

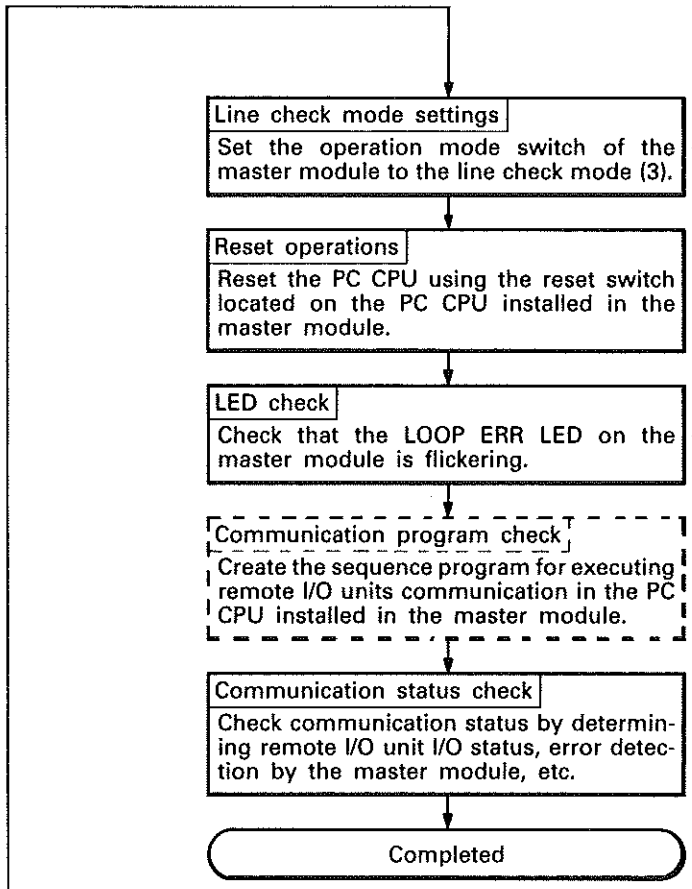
(4) Tighten module mounting screws (optional) to 8 (6.93) - 14kg·cm (12.1lb·inch) torque.

(5) To load the module onto the base, hook the two lower lugs into the cut out and gently swing the module into place. Ensure that the top catch engages. To remove the module, press the top catch and swing the module out before unhooking the lower lugs. (For further details, see the corresponding CPU User's Manual.)

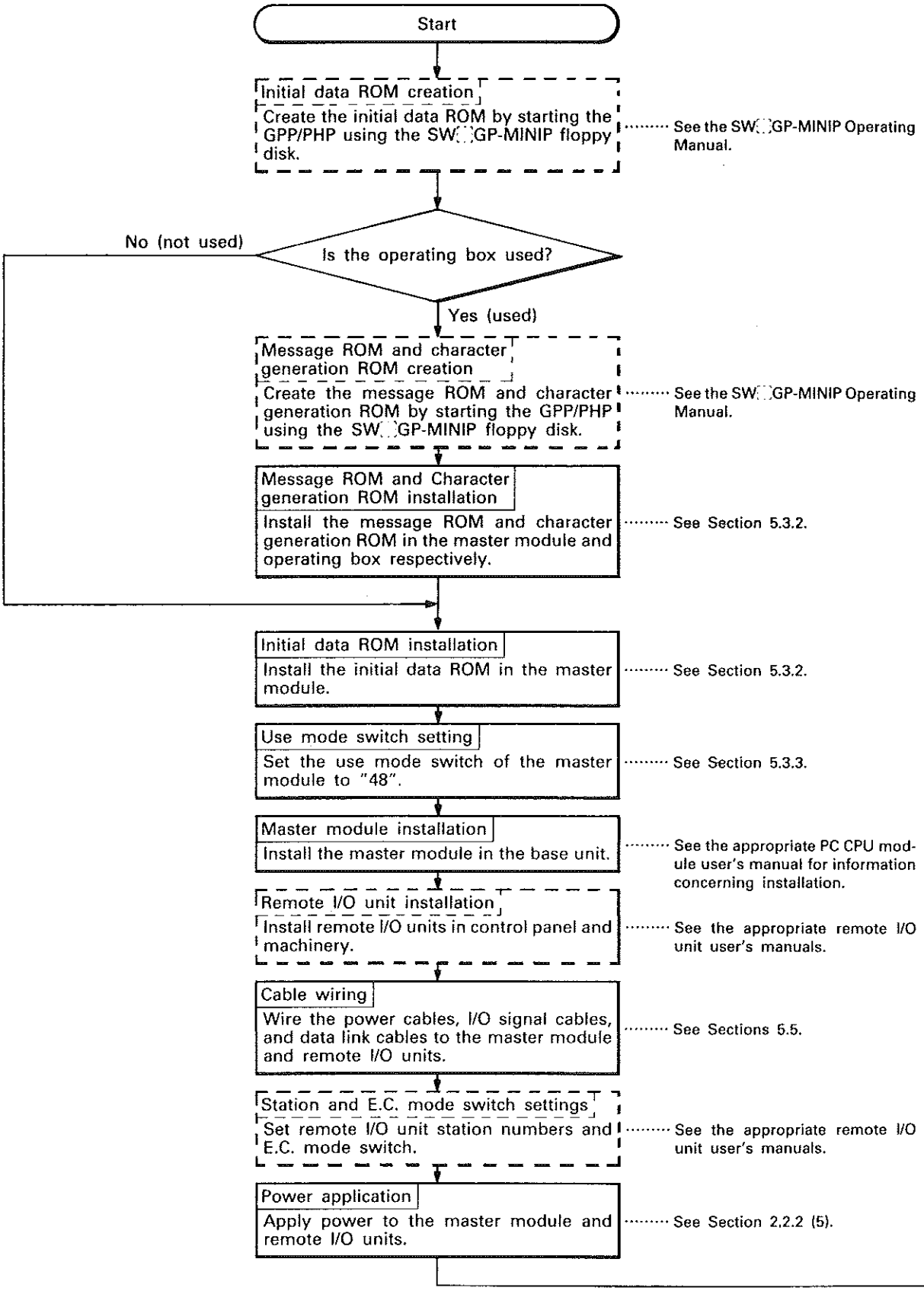
5.2 Pre-Operation Setting and Procedure

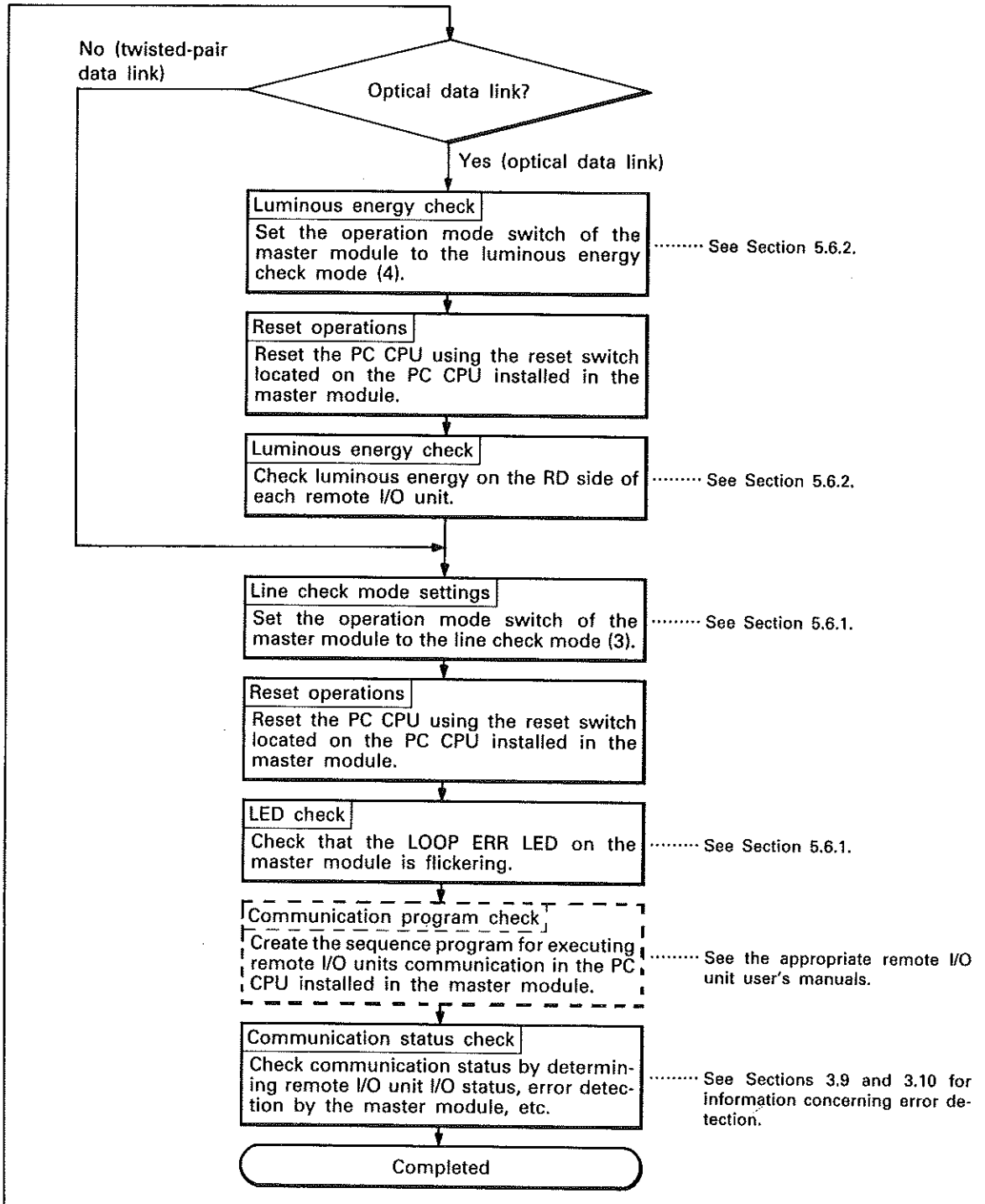
5.2.1 I/O dedicated mode




Line check mode settings
Set the operation mode switch of the master module to the line check mode (3).
See Section 5.6.1.
Reset operations
Reset the PC CPU using the reset switch located on the PC CPU installed in the master module.
LED check
Check that the LOOP ERR LED on the master module is flickering.
See Section 5.6.1.
Communication program check
Create the sequence program for executing remote I/O units communication in the PC CPU installed in the master module.
See the appropriate remote I/O unit user's manuals.
Communication status check
Check communication status by determining remote I/O unit I/O status, error detection by the master module, etc.
See Sections 3.9 and 3.10 for information concerning error detection.
Completed

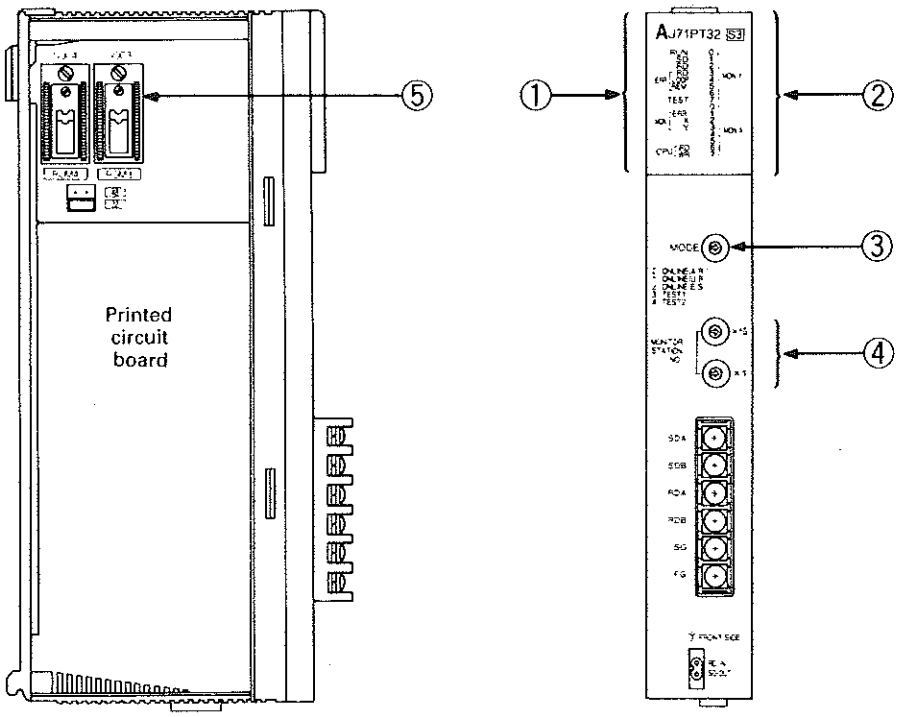
5.2.2 Extension mode




No (twisted-pair data link)
Optical data link?
Yes (optical data link)
Luminous energy check
Set the operation mode switch of the master module to the luminous energy check mode (4).
See Section 5.6.2.
Reset operations
Reset the PC CPU using the reset switch located on the PC CPU installed in the master module.
Luminous energy check
Check luminous energy on the RD side of each remote I/O unit.
See Section 5.6.2.
Line check mode settings
Set the operation mode switch of the master module to the line check mode (3).
See Section 5.6.1.
Reset operations
Reset the PC CPU using the reset switch located on the PC CPU installed in the master module.
LED check
Check that the LOOP ERR LED on the master module is flickering.
See Section 5.6.1.
Communication program check
Create the sequence program for executing remote I/O units communication in the PC CPU installed in the master module.
See the appropriate remote I/O unit user's manuals.
Communication status check
Check communication status by determining remote I/O unit I/O status, error detection by the master module, etc.
See Sections 3.9 and 3.10 for information concerning error detection.
Completed

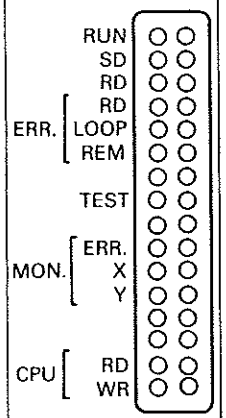
5.3 Master Station Nomenclature and Settings

5.3.1 Master module nomenclature



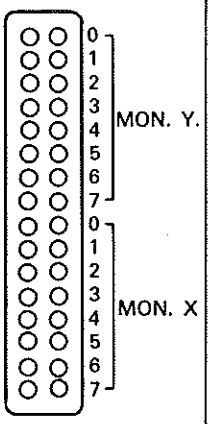
Side View　　Front View

① Operating status indicator LEDs



LED		Definition
RUN		ON indicates that the master module is normal. OFF indicates a hardware fault.
SD		Flicker indicates that data is being transmitted.
RD		Flicker indicates that data is being received.
ERR.	RD	ON indicates that a receive data error has occurred.
	LOOP	ON indicates that a line error has occurred.
	REM	ON indicates that a station is faulty.
TEST		ON indicates test mode.
MON.	ERR.	ON indicates that the remote I/O station selected by the monitor station number setting switch is faulty.
	X	ON indicates that the remote I/O station selected by the monitor station number setting switch is an input unit.
	Y	ON indicates that the remote I/O station selected by the monitor station number setting switch is an output unit.
CPU	RD	ON indicates that the FROM instruction has been executed from the PC CPU.
	WR	ON indicates that the TO instruction has been executed from the PC CPU.

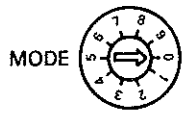
② Remote I/O station monitoring LEDs



Indicates the I/O status of the corresponding remote I/O station selected by the monitor station number setting switch.
I/O status of partial refresh type remote I/O units and remote terminal units cannot be monitored.

LED		Definition
MON.	Y0	Indicates the transmission data of the remote I/O station selected by the monitor station number setting switch.
	Y1	
	Y2	
	Y3	
	Y4	
	Y5	
	Y6	
	Y7	
MON.	X0	Indicates the receive data of the remote station selected by the monitor station number setting switch.
	X1	
	X2	
	X3	
	X4	
	X5	
	X6	
	X7	

③ Operation mode setting switch



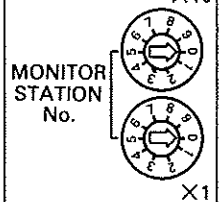
Used to switch the link module mode.

Switch Position	Mode	Description
0	ONLINE (A.R.)	Online automatic return
1	ONLINE (U.R.)	Online no-automatic return
2	ONLINE (E.S.)	Communication stop at online error detection
3	TEST 1	Line check mode
4	TEST 2	Luminous energy check mode
5 to 9	——	Not used

REMARKS

The TEST LED is lit when 5 is selected. The RUN and TEST LEDs are switched OFF when any of 6 to 9 is selected.

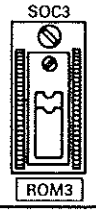
④ Monitor station number setting switch



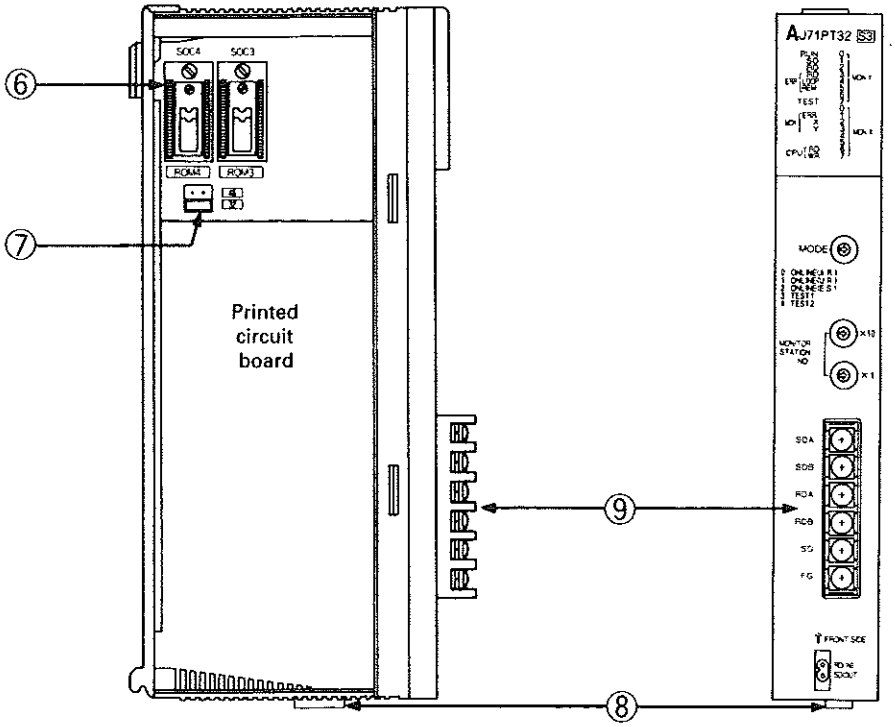
Sets the remote I/O station number to be monitored on the corresponding batch refresh type remote I/O station monitoring LED. For details, refer to 5.3.5.

- Set a station number in the range of 01 to 64.
- X10: Left digit of a station number
- X1 : Right digit of a station number

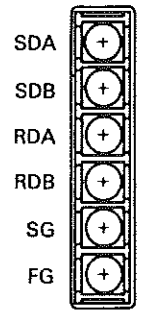
⑤ Installation socket for the initial data ROM



This socket is used to install the ROM containing the initial data when the master module is used in the extension mode. (The ROM need not be when the master module is used in the dedicated mode.)
Initial data is written to the ROM using the SW□-MINIP type system floppy disk.
For further information concerning the installation and removal of the ROM chip, see Section 5.3.2.



⑥	Installation socket for the message ROM SOC4 ROM4	This socket is used to install the ROM containing message data used for display on the LCD of the operating box when the operating box is used in the MINI-S3 link. (The ROM need not be installed when the operating box is not used.) Message data is written to the ROM using the SW□-MINIP type system floppy disk. For further information concerning the installation and removal of the ROM chip, see Section 5.3.2.
⑦	Jumper for the use mode switch 48 32	This jumper determines whether the master module operates in the extension mode or the I/O dedicated mode. Extension mode ·····Jumper is placed in the "48" position. I/O dedicated mode ·····Jumper is placed in the "32" position. **REMARKS** 1. The jumper is set in the "32" position when shipped from the factory. 2. "32" and "48" are the number of I/O points in the master module when set in the corresponding mode.
⑧	Connector for the optical fiber cable RD(IN) SD(OUT)	This connector is used for an optical fiber cable when communication with remote units is conducted in an optical data link. (For further information concerning connection between cables and the remote units, see Sections 5.5.2 and 5.5.4.) RD(IN) : Connected to SD(OUT) of the previous station. SD(OUT) : Connected to RD(IN) of the succeeding station.

⑨	Twisted-pair cable terminal block  	This connector is used for an twisted-pair cable when communication with remote units is conducted in a twisted-pair data link. (For further information concerning connection between cables and the remote units, see Section 5.5.3 and 5.5.4.) SDA : Connected to RDA of the succeeding station SDB : Connected to RDB of the succeeding station RDA : Connected to SDA of the previous station RDB : Connected to SDB of the previous station SG : Connected to SG of the succeeding and previous stations FG : Connection of shield of shield cable and grounding wire

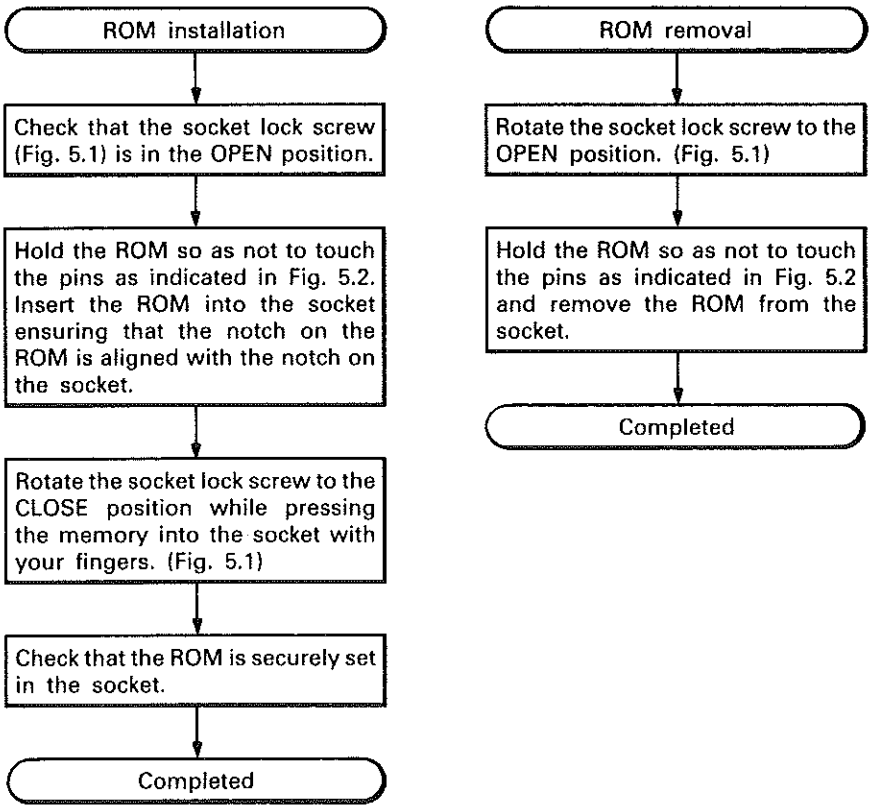
5.3.2 Installation and removal of ROM (extension mode)

POINT

(1) The ROM chips are not supplied with the master module and should be purchased by the user.

(2) Only 16K ROM may be used.

(3) Initial data ROM and message ROM are created using the SW□GP-MINIP type system floppy disk.



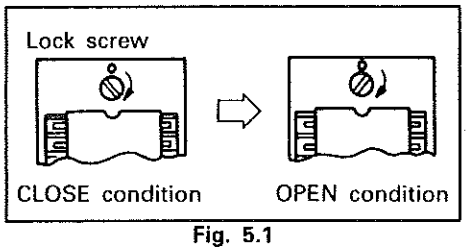


Fig. 5.1

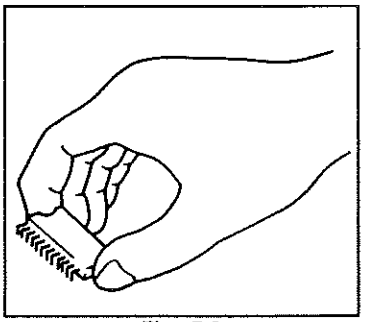


Fig. 5.2

5.3.3 Jumper settings for the use mode switch

This jumper determines whether the master module operates in the extension mode or the I/O dedicated mode.

POINT

(1) The jumper is set in the "32" position (I/O dedicated mode) when shipped from the factory.
(2) "32" and "48" are the number of I/O occupied points in the master module when set in the corresponding mode.

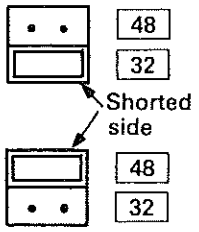
Settings are made as indicated below.

(1) Operation in the I/O dedicated mode

Jumper is placed in the "32" position. ·····

(2) Operation in the extension mode

Jumper is placed in the "48" position. ·····



5.3.4 Operation mode switch settings

The operation mode switch selects the mode in which the MINI-S3 link operates.
The operation mode switch provides three types of online modes and two test modes.

Switch Position	Mode	Description	Remarks
0	ONLINE (A.R.)	Online automatic return Disconnects a faulty remote station from the system and continues I/O refresh with the other stations if a communication error occurs and automatically returns the faulty station to the system when the fault is removed.	Online mode
1	ONLINE (U.R.)	Online no-automatic return Disconnects a faulty remote station from the system and continues I/O refresh with the other stations if a communication error occurs. The system should be restarted up to return the faulty station to the system.	Online mode In online no-automatic return mode, all outputs of the faulty remote station are switched OFF independently of its E.C. MODE switch setting (ON/OFF).
2	ONLINE (E.S.)	Communication stop at online error detection Disconnects all remote stations (stops I/O refresh) from the system if a communication error occurs at any remote station. The system should be restarted up to return all stations to the system.	Online mode
3	TEST 1	Line check mode Checks for MINI-S3 link hardware fault and cable breakage.	Test mode
4	TEST 2	Luminous energy check mode Measures luminous energy at the receive terminal of each remote I/O station in an optical data link system.	Test mode
5 to 9	——	Not used	The TEST LED is lit when 5 is selected. The RUN and TEST LEDs are switched OFF when any of 6 to 9 is selected.

POINT

When the operation mode has been changed, always reset operation using the reset switch of the PC CPU. Operating status remains the same if the PC CPU is not reset.

5.3.5 Monitor station number setting switch

By setting this switch as required, the I/O status of the corresponding batch refresh type remote I/O station can be monitored by the LED on the master module front panel.
The I/O status of any partial refresh type remote I/O station and remote terminal unit cannot be monitored.

(1) Set the required remote I/O station number.

(2) The following states can be monitored:

(a) Corresponding remote I/O station communication status ("MON.ERR" LED)
- ON indicates that a communication error has been detected. OFF indicates a normal communication status.

(b) Corresponding remote I/O station unit status ("MON.X, Y" LEDs)
- The "MON.X" LED is lit to indicate that the remote I/O station is an input unit.
- The "MON.Y" LED is lit to indicate that the remote I/O station is an output unit.
- All "MON.X, Y" LEDs are switched OFF when the PC CPU is powered up or reset.

(c) Corresponding remote I/O station I/O status ("MON.Y0 to Y7, MON.X0 to X7" LEDs)
- The "MON.Y0 to Y7" LEDs indicate the contents of the transmission data area (buffer memory addresses 10 to 41).
- The "MON.X0 to X7" LEDs indicate the contents of the receive data area (buffer memory addresses 110 to 141).

(3) The remote I/O station status can only be monitored when the mode setting switch is set to 0, 1 or 2 (online mode).

POINT

(1) Remote I/O station I/O status monitoring allows the batch refresh transmission and receive data in the buffer memory to be displayed.

(2) The monitor station number switch can be changed any time. (It is not necessary to reset the PC CPU after changing the station number.)

5.4 Setting the Remote I/O Station Numbers

Specify the remote I/O station numbers to determine the buffer memory addresses for remote I/O station data, noting the following:

POINT

Any station number must not be changed during I/O refresh to prevent input or output fault.

(1) Station numbers may be set between 1 and 64.

(2) The I/O refresh range depends on the number of remote stations (buffer memory address 0). For example, if 10 exists at address 0, I/O refresh is performed with remote stations 1 to 10.

(3) Station numbers do not have to be sequential, e.g. as shown in Fig. 5.3.

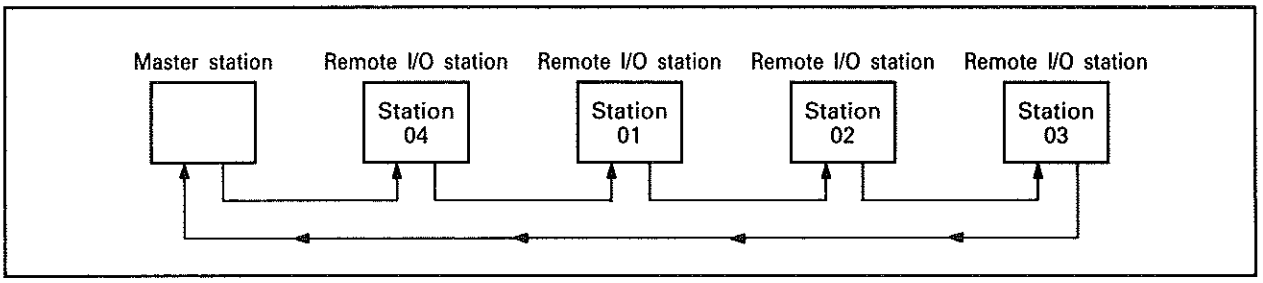


Fig. 5.3 Remote I/O Station Number Setting

REMARKS

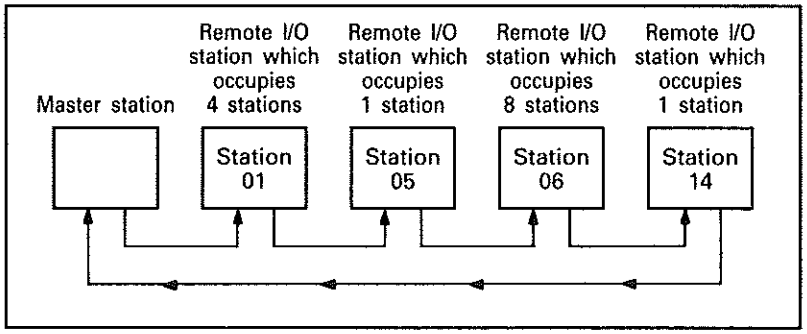
It is suggested to set sequential numbers to the input and output remote I/O stations individually so that the transmission and receive data is transferred sequentially.
For instance, if there are 10 input and 10 output remote I/O stations, set 1-10 to the input remote I/O stations and 11-20 to the output stations. This defines the receive data addresses as 110-114 and the transmission data addresses as 15-19 to allow sequential data transfer.

(4) Remote I/O station numbers must not be skipped. Any station with a number specified but without a remote unit connected is regarded as faulty.

POINT

(1) A remote I/O station number must not be repeated in the same loop. After setting, check that the same number has not been used more than once.

(2) Station numbers must be specified in accordance with the number of stations occupied by the remote I/O station, e.g. the remote I/O station that occupies four stations (station 01 in the following example) must be accounted for as stations 1 to 4:



5.5 Wiring

5.5.1 Handling instructions for optical fiber and twisted-pair cables

Handle cables with special care.

(1) Do not bend the cable to less than specified minimum bending radius.
(2) Do not crush the cable.
(3) Do not twist the cable.
(4) Do not pull the cable by the connector.
(5) Do not tension the cable.

5.5.2 Connection of optical fiber cables

(1) Connect the optical fiber cables as shown in Fig. 5.4.

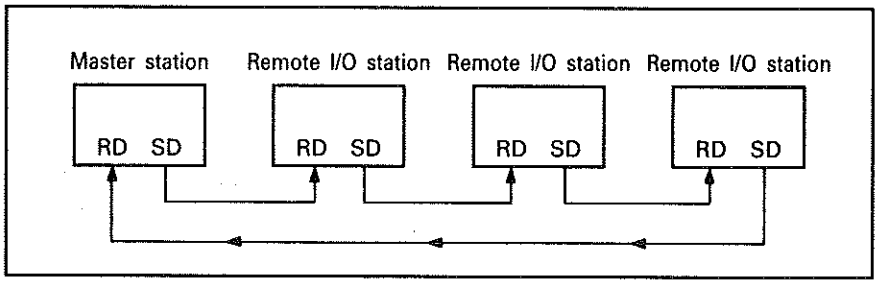


Fig. 5.4 Connection of Optical Fiber Cables

POINT

Station numbers may be set independently of the data link cable connection sequence. For full information, see Section 5.4.

(2) Optical fiber cable engagement

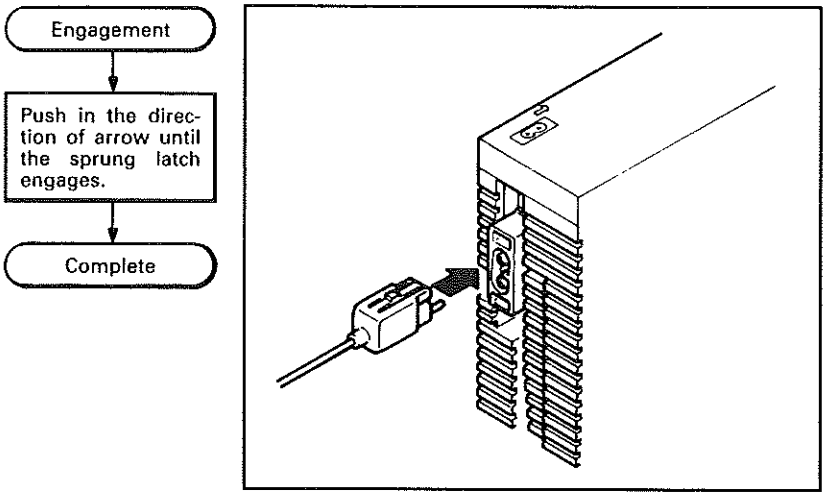


Fig. 5.5 Optical Fiber Cable Engagement

(3) Optical fiber cable disengagement

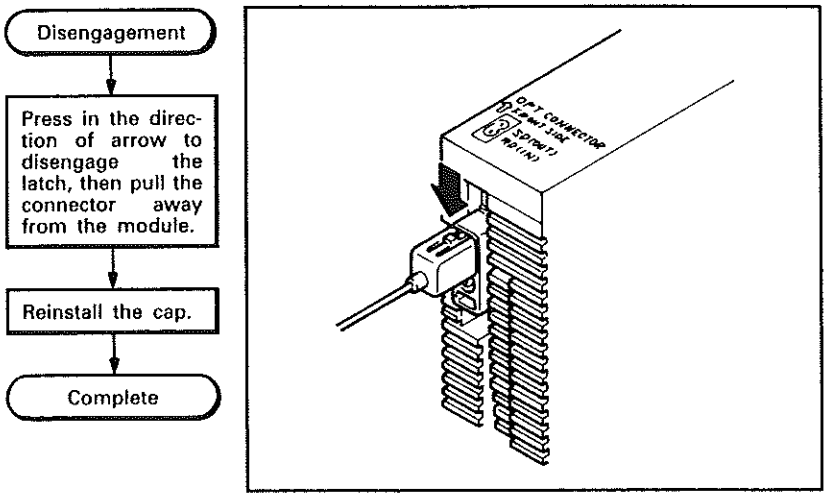
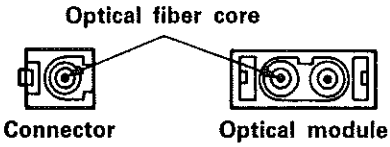


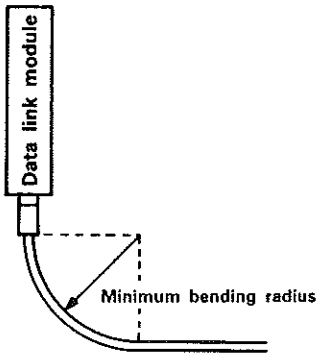
Fig. 5.6 Optical Fiber Cable Disengagement

POINT

(1) Do not touch the optical fiber cores in the connector or the optical module and keep them clean. Always fit the protective cap to the connector and optical module when not in use.

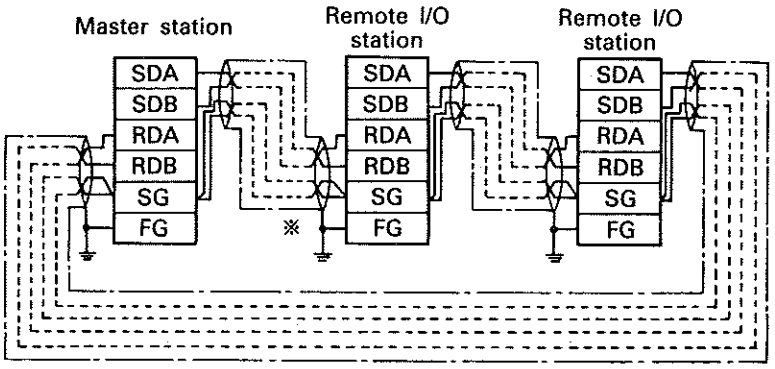


(2) Any optical fiber cable must be bent within its minimum bending radius to protect the optical fiber core.



5.5.3 Connection of twisted-pair cables

Connect the twisted-pair shield cables as shown in Fig. 5.7. The terminal arrangement of the remote I/O station is given in the MELSECNET/MINI Remote I/O User's Manual.



*Ground the shields of the receive or transmission terminals at one point.

Fig. 5.7 Connection of Twisted-Pair Cables

REMARKS

(1) The twisted-pair shield cable terminal block uses M4 (0.16) screws. Use appropriate solderless terminals.
(2) Tightening torque is 8 (6.93) to 14kg·cm (12.1lb·inch).

POINT

When routing twisted-pair cables, pay cautions on the following points:

(1) Do not run or bundle the twisted-pair cables close to or with the main circuit, high-tension cables or load cables. Allow at least 100mm (4inch) clearance.
(2) When connecting the cables to the remote unit terminal block, run the twisted-pair cable as apart from the power supply or I/O cables as possible.
(3) Do not use a part of the twisted-pair cables (1 pair of 3 pairs of twisted-pair cable) for the power supply cable.

5.5.4 Connection of units for both optical and twisted-pair data links

Both the optical fiber and twisted-pair cables may be used in the same loop to connect any link unit for use as an optical/twisted-pair data link model as shown in Fig. 5.8.

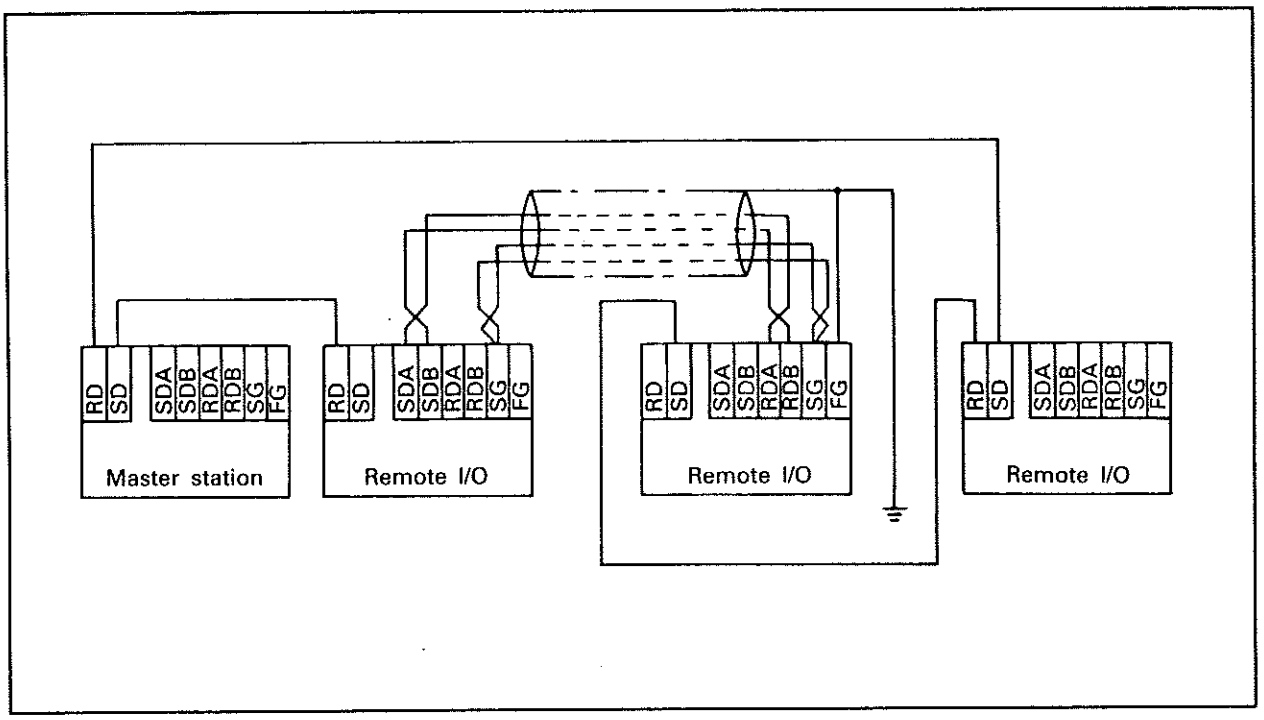


Fig. 5.8 Connection of Cables for Optical/Twisted-Pair Data Link Model

POINT

(1) Ground the shields of the receive or transmission terminals at one point.
(2) For the connection of an optical/twisted-pair data link model, use either optical or twisted-pair cable. Connection using both of these cables is not allowed.
(3) Fit the supplied protective caps to optical connectors not in use.

5.6 Test Mode

5.6.1 Line check mode

Used to check for link unit hardware fault and optical fiber/twisted-pair cable breakage.
In the optical data link system, line check must be performed after measuring luminous energy.

(1) Checking procedure

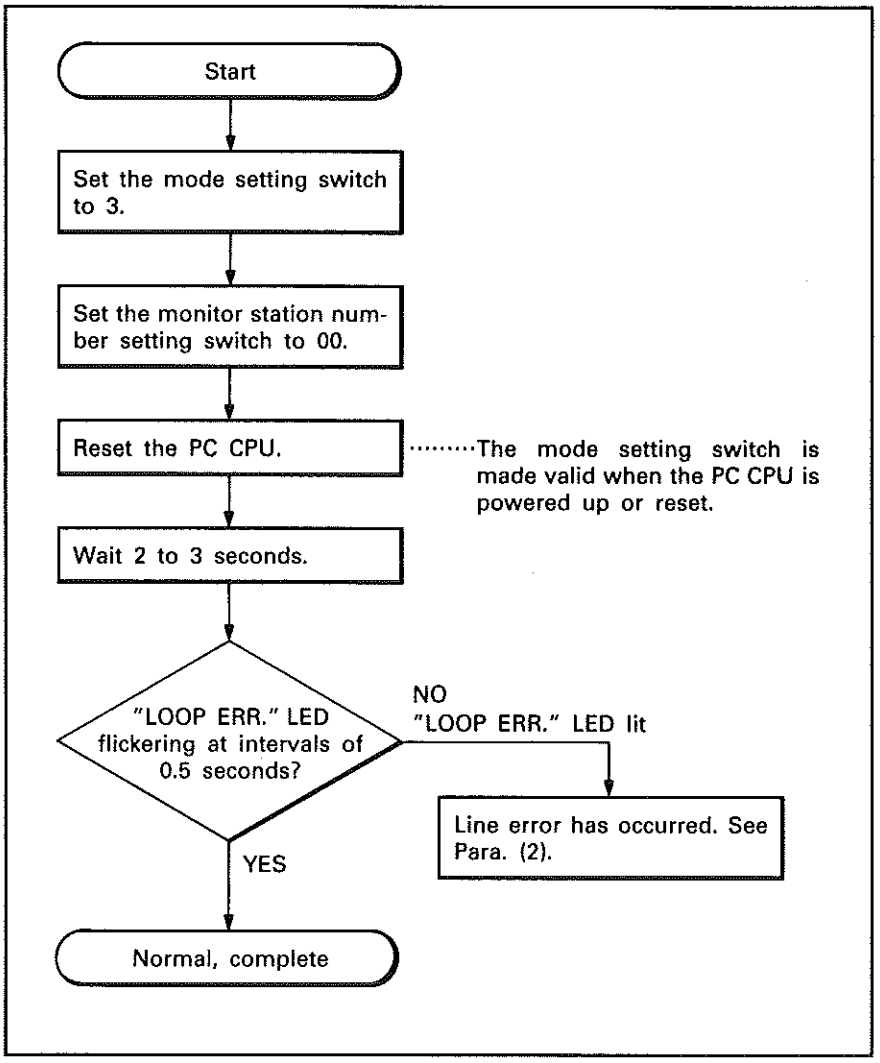


Fig. 5.9 Line Check Procedure

(2) Corrective action
Check the RD and SD LEDs of all stations in data link cable connection order, beginning with the master station transmission (SD) LED. Check the link unit hardware and data link cables as explained below:

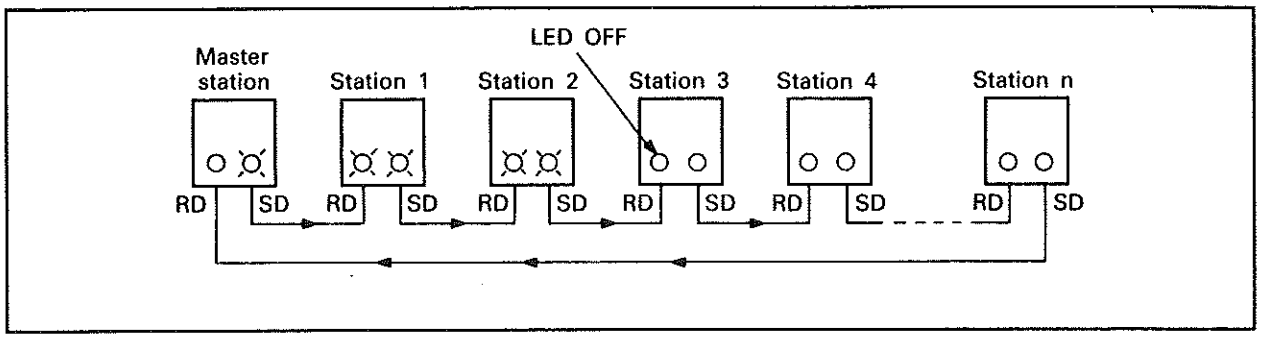


Fig. 5.10 RD/SD LED States at Line Error Occurrence

In Fig. 5.10, the RD and SD LEDs on station 3 are OFF possibly because:

(a) The data link cable between station 2 SD and station 3 RD is not connected, is broken or its length is greater than the maximum interstation transmission distance.
- Check connection of the data link cable.
- Change the data link cable.
- Check the cable connection distance.

(b) Data link unit hardware of station 2 is faulty.
- Connect the cable between station 1 SD and station 3 RD.

(c) Data link unit hardware of station 3 is faulty.
- Connect the cable between station 2 SD and station 4 RD.

POINT

When the value of the transmission status setting (address 4) is either 1 or 2 and a faulty line has occurred, checks can be made using the "RUN" LED in place of the "RD" and "SD" LEDs.

(3) Checks for units without RD or SD LED
When checks are being made for remote units such as the operating box which do not have RD or SD LED, the RUN LED can be used by setting the faulty line check (address 4) of the buffer memory of the master module to either "1" or "2".

(a) Since in the faulty line check the RUN LEDs light up to the point that the line fault occurred, as indicated below, check the hardware or link cable between the last remote unit with a lit RUN LED and the remote unit with the extinguished RUN LED.

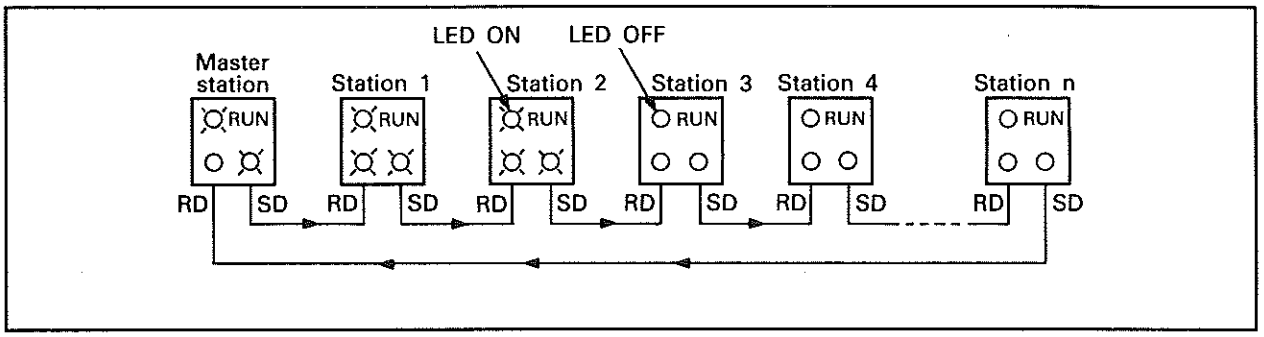


Fig. 5.11 RD/SD LED Status When Line Fault Has Occurred

(b) The line error check forces the output of OFF data or the value of data that existed directly prior to the fault occurring of each of the remote units to turn on the RUN LED. (If no line error has occurred, normal data is output.)

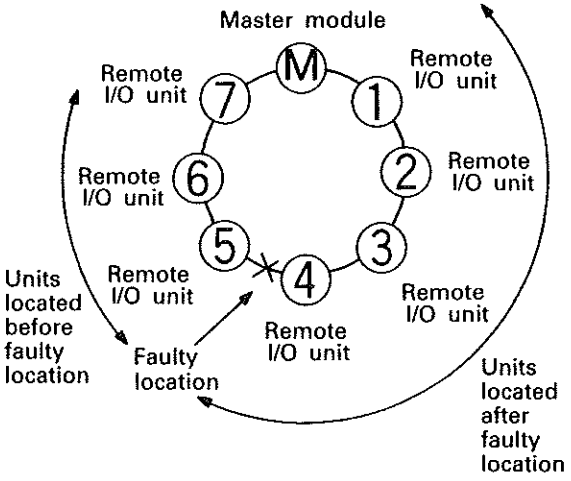
POINT

When a line error check is performed, the E.C. mode setting of the output remote I/O units is no longer effective as the data is output forcibly to each of the remote units.
Note that this means that the output status set by the E.C. mode setting at the point the error occurred is changed by the line error check.

(c) The line error check is performed by either a "1" or "2" being set in buffer memory address 4.
The value becomes effective when the communication start signal ($Y_{(n+18)}$ / $Y_{(n+28)}$) is set from OFF to ON.
0: Normal data link operations
1: Outputs OFF data, and line error check is performed
2: The value of data that existed directly prior to the fault occurring is output, and line error check is performed.

(d) The value of line error check settings and the output status to each of the output remote I/O units is indicated below.

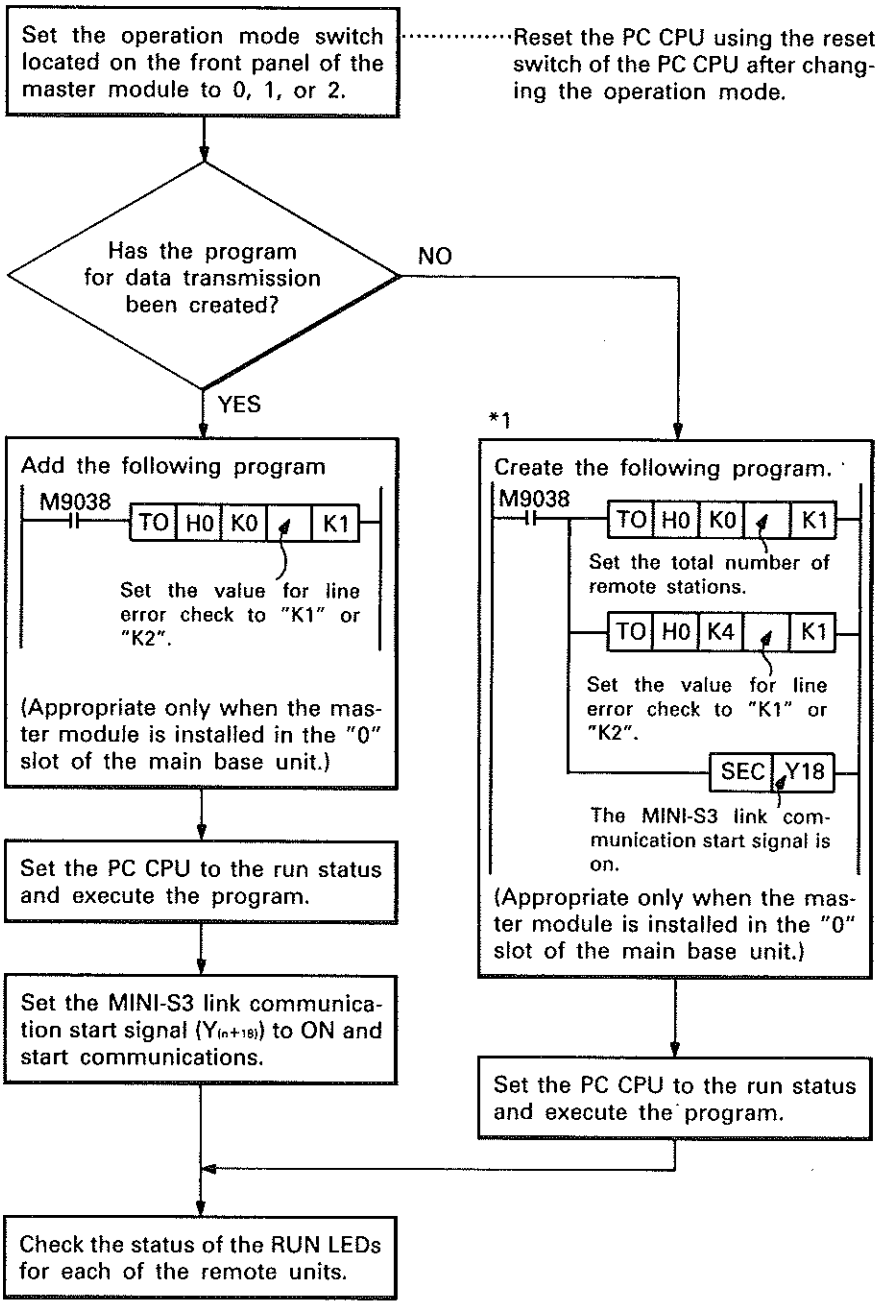
Operation Mode Switch (located on front panel of master module)	Line Error Check Setting (buffer memory address 4)	Output Status of the Remote I/O Units			
		Units located before faulty location		Units located after faulty location	
		E.C. mode setting ON	E.C. mode setting OFF	E.C. mode setting ON	E.C. mode setting OFF
0	0	All output points are switched OFF	The data existing directly prior to the fault occurring is retained.	All output points are switched OFF	The data existing directly prior to the fault occurring is retained.
	1	All output points are switched off			
	2	The data existing directly prior to the fault occurring is retained.			
1, 2	0	All output points are switched OFF	The data existing directly prior to the fault occurring is retained.		
	1, 2	All output points are switched OFF			



(e) The output data (the data which uses the transmit area (addresses 1100 to 8099) for the remote terminal unit) corresponding to the remote terminal unit retains output data regardless of the setting of the line error check.

(f) Operation procedure is given below.

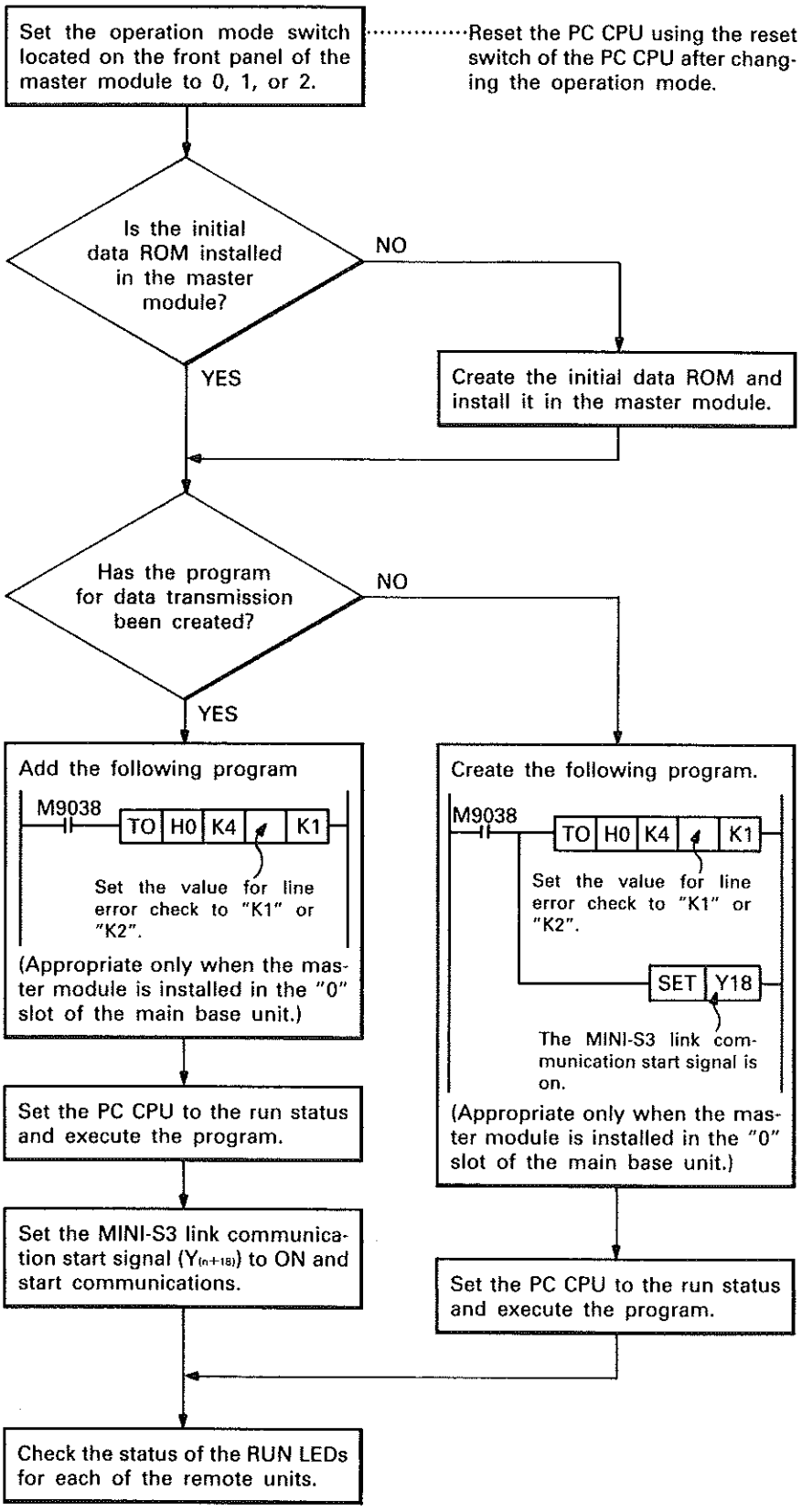
I/O dedicated mode



POINT

The AJ35PTF-128DT RUN LED will not light when the partial refresh type remote I/O unit (AJ35PTF-128DT) is connected, and a check is conducted using the "*1" program,.
(This is because initial setting has not been made for the AJ35PTF-128DT.)
Check using the "RD" and "SD" LEDs instead.

Extension mode



5.6.2 Luminous energy check mode

Used to measure luminous energy at the receive (RD) terminals of all stations in an optical data link system.
This check determines whether the optical fiber cable connectors have been processed appropriately.

REMARKS

This check is made by using the optical power tester available from Mitsubishi.

Luminous energy check procedure is as follows:

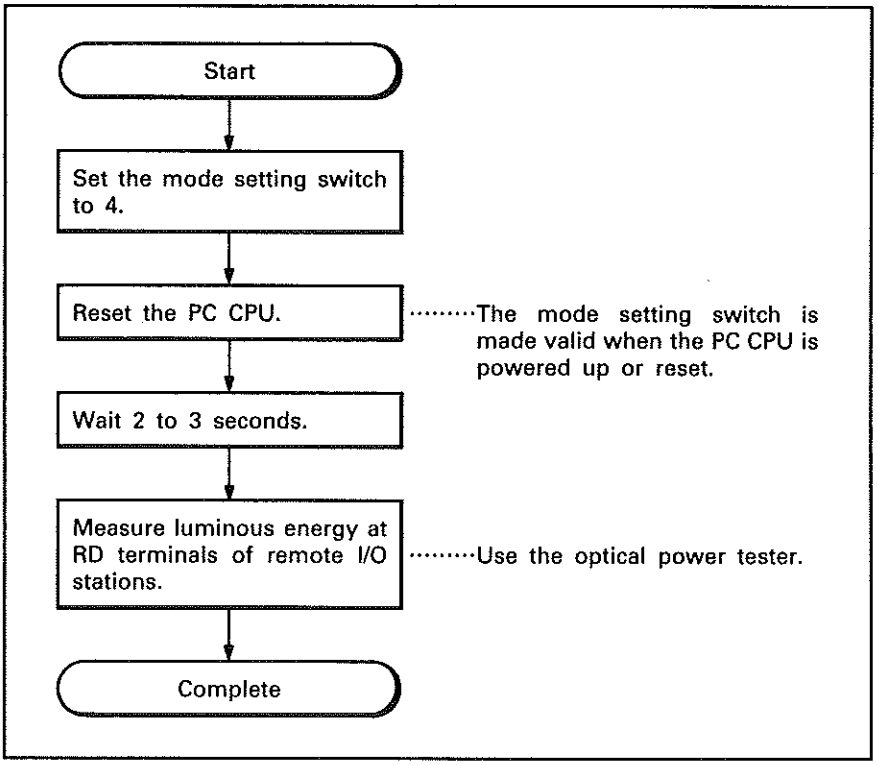


Fig. 5.11 Luminous Energy Check Procedure

6. TROUBLESHOOTING

6.1 Data Communication Errors

There are two types of errors which may occur during data communication between the master module and remote stations.

(1) Error which only stops data communication with the faulty remote unit.

(2) Error which stops data communication with all remote units.

REMARKS

A communication error indicates that normal communication could not be made after retries had been made the number of retries set to buffer memory address 1.

6.1.1 Data communication continue error

The following operations are performed when the error occurring only stops communication with the faulty station and continues communication with the other stations:

(1) When an error occurs with a remote I/O unit
  (a) The MINI-S3 link error detection ($X_{(n+6)}$ / $X_{(n+26)}$) is turned ON. This signal is turned OFF when communication is restored. For further details, see Section 3.9.

  (b) Stores the faulty station number to buffer memory addresses 100-103,
    1) Sets 1 to the corresponding bit.
    2) In the automatic return mode, the corresponding bit is reset to 0 when the faulty station is restored.
    3) In the no-automatic return mode, the corresponding bit remains 1.

  (c) Stores the accumulative faulty station numbers to buffer memory addresses 90-93. This area stores the accumulative result of faulty stations explained in (2).

  (d) Stores the error detection code in buffer memory address 108. 1 is written to this address when any station causes a communication error. 1 remains if communication is restored.

  (e) Clears the faulty station, accumulative faulty station and error detection code when the MINI-S3 link communication start ($Y_{(n+18)}$ / $Y_{(n+28)}$) is turned from OFF to ON.

  (f) Switches ON the "ERR. REM" LED of the master module.

  (g) Switches OFF all outputs of the faulty station in the no-automatic return mode.

(2) When an error as indicated in Section 6.2 occurs with the remote terminal unit

(a) The remote terminal unit error detection ($X_{(n+24)}$) is turned ON.
This signal is turned OFF when the remote terminal unit error detection reset ($Y_{(n+24)}$) is turned from OFF to ON. For further details, see Section 3.9.

(b) Stores the faulty remote terminal unit number to buffer memory address 195.
1) Sets 1 to the corresponding bit.
2) The corresponding bit is reset to 0 when the faulty station is restored to allow correct communications or the remote terminal error detection reset signal is turned ON.

(c) Stores the code indicating the error contents in buffer memory addresses 196 to 209.
The code is cleared when the error reset ($Y_{(n+20)}$) is turned ON while the MINI-S3 link communication start signal ($Y_{(n+28)}$) is OFF or when the MINI-S3 link communication start signal ($Y_{(n+28)}$) is turned from OFF to ON.

POINT

The data communication continue error may occur when:
(1) The total number of remote stations connected does not coincide with the number of remote stations (address 0) specified. For example, an error occurs at station 3 when the number of stations set is 5 and there are stations 1, 2, 4 and 5 connected.
(2) The fuse in an output remote I/O unit has blown.
(3) An error as indicated in Section 6.2 occurs with a remote terminal unit.
(4) A communication data error has occurred due to noise. In this case examine the data link cable wiring and grounding methods.

6.1.2 Data communication stop error

The following operations are performed when the error occurring has stopped data communication with all remote I/O stations.

(1) Switches the MINI-S3 link communication in-progress signal ($X_{(n+1)}$ / $X_{(n+21)}$) OFF and the MINI-S3 link error detection signal ($X_{(n+7)}$ / $X_{(n+27)}$) ON.

(2) Stores the corresponding error code to buffer memory address 107.

Error Code	Definition	Cause
0	No error	———
1	Initial data error	I/O refresh has been initiated after while there are errors in the setting of: • total number of remote I/O stations • number of retries • partial refresh stations • line error check • parameter for the no-protocol mode
2	Line error	Any data link cable has been broken or remote I/O station power switched OFF.
3	Station fault	Data communication has been stopped due to station fault with the mode setting switch set to 2 (communication stop specified at online error detection).
4	Faulty partial refresh type remote I/O station	Data communication has been stopped due to an error occurring in input from the partial refresh type remote I/O station with the mode setting switch set to 2 (communication stop specified at online error detection).

Table 6.1 Communication Error Code List

(3) When code 3 is stored to address 107, 1 is set to the corresponding bit of the faulty station area (addresses 90 to 93) and accumulative faulty station area (addresses 100 to 103).

(4) The communication error code can be cleared by:
  (a) Turning the MINI-S3 link communication start signal from OFF to ON.
  (b) Turning the error reset signal ($Y_{(n+10)}$ / $Y_{(n+20)}$) from OFF to ON with the MINI-S3 link communication start ($Y_{(n+18)}$ / $Y_{(n+28)}$) OFF.

(5) The faulty station and accumulative faulty station bits are reset to 0 when the MINI-S3 link communication start signal ($X_{(n+18)}$ / $X_{(n+28)}$) is turned from OFF to ON.

6.2 Table of Error Codes for Errors Occurring During Remote Terminal Unit Communication

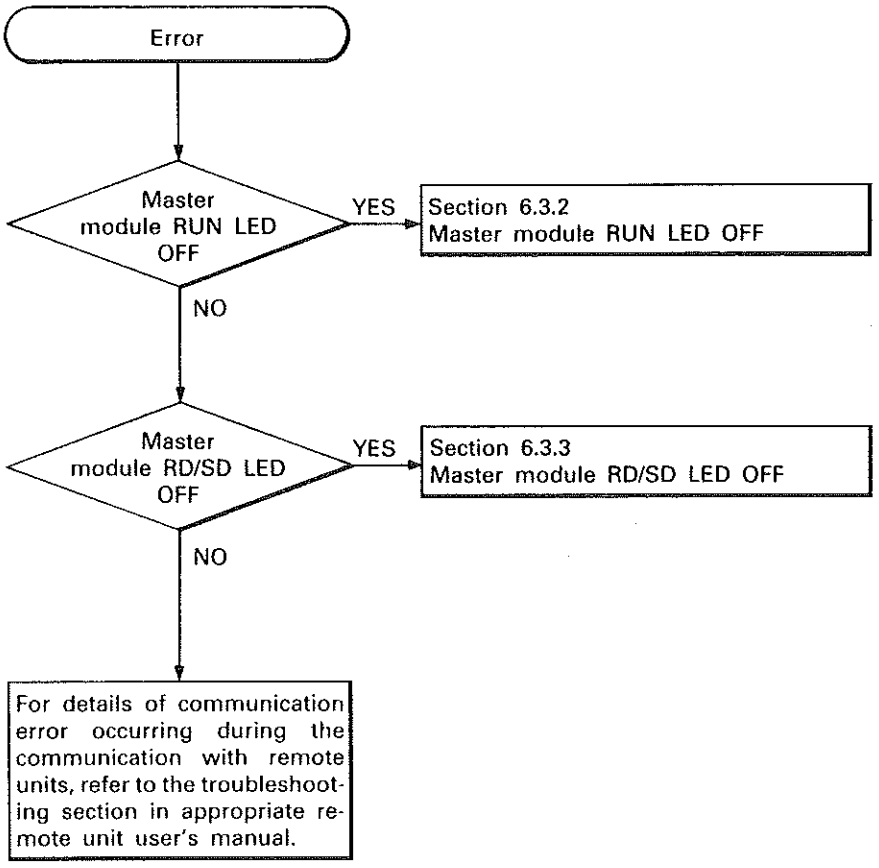
When an error occurs during communication between the master module and remote terminal units, the remote terminal unit fault detection signal ($X_{(n+24)}$) is set to ON and the number of the faulty station is set in buffer memory address 195 and the error code is stored in address 196 to 209.
The following table lists the contents of the error codes stored in the buffer memory address 196 to 209 and the relevant processing.

Error Code (decimal)	Error Name	Error Content	Processing
1	Data setting error	An error exists in the data set in a remote terminal transmit data area.	See the relevant remote terminal unit user's manual and set the correct data.
2	Bar-code read error	An error occurred due to the bar-code reader connected to the AJ35PTF-R2 being unable to read bar-code.	See the manual for the bar-code reader being used and take appropriate action.
3	ID card access error	An error occurred while an ID card controller is connected to the AJ35PTF-R2 due to one of the following causes. • A battery is not installed in the ID card, or the battery is low.	• See the manual for the ID card controller being used and install or replace the battery.
		• An ID card was not present when a data read request was made, or the data could not be read.	• Set the timing, location, and position of the ID card so that the ID card data can be read correctly when a read request is made.
		• Commands from the master module to the ID card controller are not transmitted in the proper format.	• Noise may be a possible cause of the error. Attempt communication one more time. If the error occurs again, use the troubleshooting procedures outlined in the AJ35PTF-R2 RS-232C Interface User's Manual.
4	ID card battery error	An error occurred while an ID card controller is connected to the AJ35PTF-R2 due to the lack of a battery in the ID card, or to its being low. (Read data is stored correctly in the buffer memory.)	See the manual for the ID card controller being used and install or replace the battery.
5	ID card data receive error	An error occurred while an ID card controller was connected to the AJ35PTF-R2 due to response data not being transmitted to the master module in the proper format in response to a read request command from the master module.	• Noise may be a possible cause of the error. Attempt communication one more time. If the error occurs again, use the troubleshooting procedures outlined in the AJ35PTF-R2 RS-232C Interface User's Manual.
8	Transmit data area setting error	An error occurred because the number of bytes set for the transmit data portion of the communication data area used for the remote terminal units is less than the specified number of bytes.	See the relevant remote terminal unit user's manual and set the required number of bytes for transmission data in the transmit data area.
9	Communication error	An error occurred in communication between the master module and remote terminal units.	Noise or a faulty remote terminal unit may be possible causes of the error. See Section 6.3.1 and take appropriate action.
10	Transmit data area setting error	An error occurred because the number of bytes set for the receive data portion of the communication data area used for the remote terminal units is less than the specified number of bytes.	See the relevant remote terminal unit user's manual and set the required number of bytes for receive data in the receive data area.

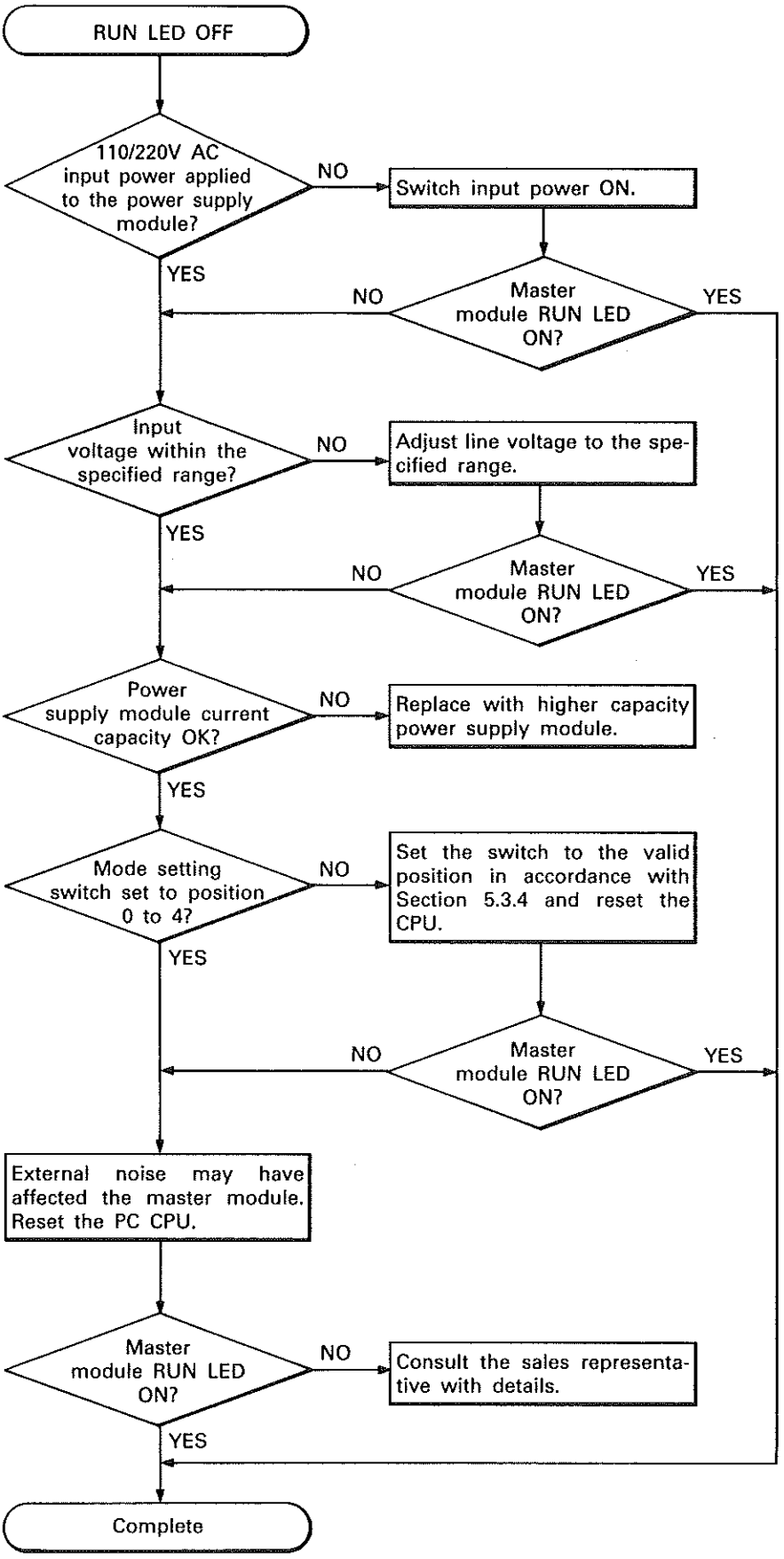
6.3 Troubleshooting

For information on PC CPU unit troubleshooting, see the corresponding CPU User's Manual.

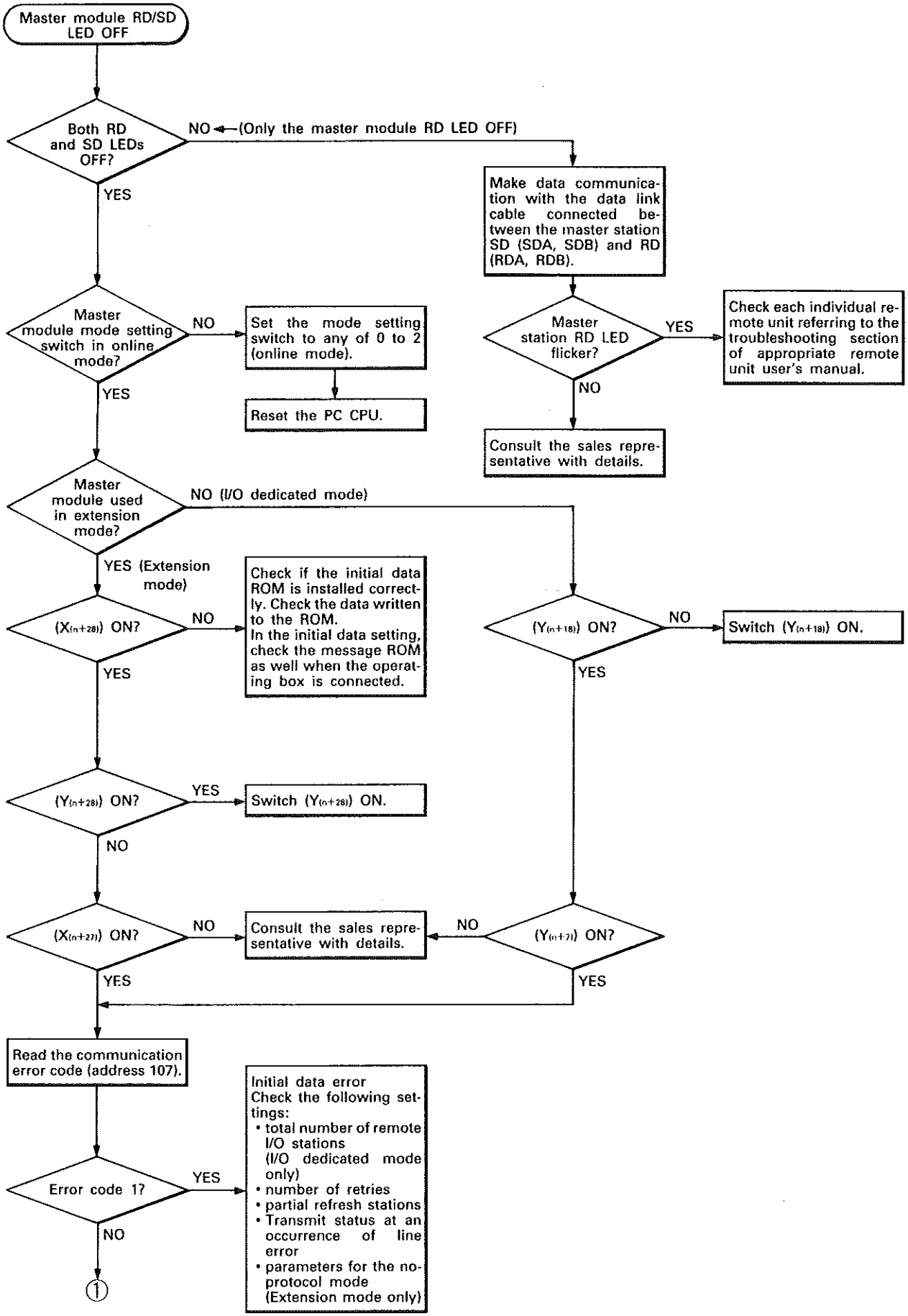
6.3.1 General troubleshooting flowchart

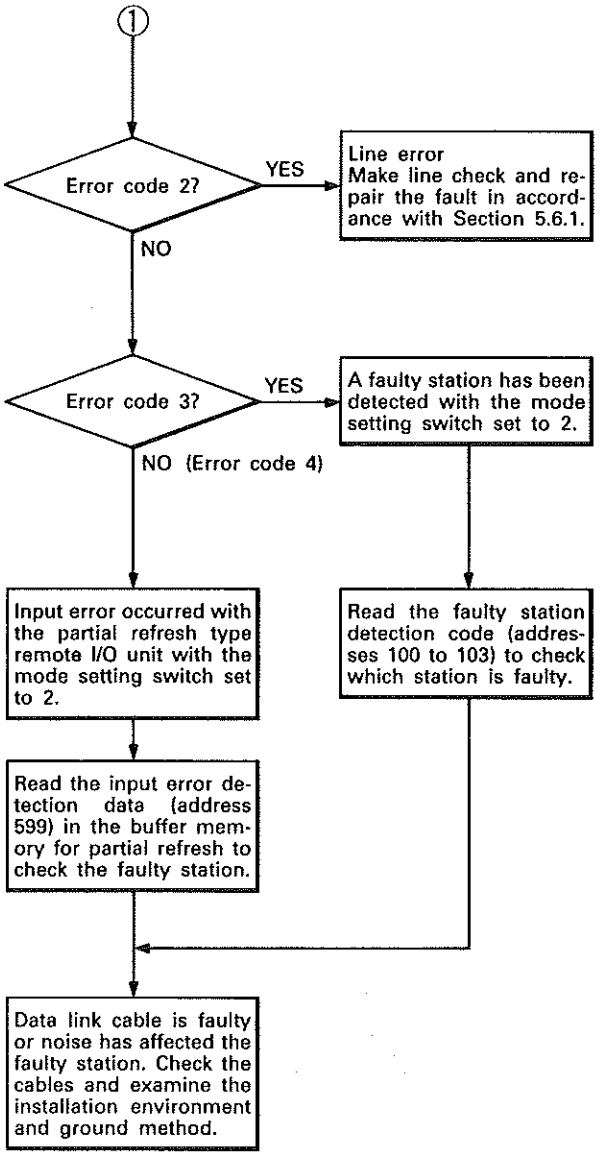


6.3.2 Master module RUN LED OFF



6.3.3 Master module RD/SD LED OFF




①
Error code 2?
YES
Line error
Make line check and repair the fault in accordance with Section 5.6.1.
NO
Error code 3?
YES
A faulty station has been detected with the mode setting switch set to 2.
NO (Error code 4)
Input error occurred with the partial refresh type remote I/O unit with the mode setting switch set to 2.
Read the faulty station detection code (addresses 100 to 103) to check which station is faulty.
Read the input error detection data (address 599) in the buffer memory for partial refresh to check the faulty station.
Data link cable is faulty or noise has affected the faulty station. Check the cables and examine the installation environment and ground method.

APPENDICES

APPENDIX 1 AJ71PT32 and AJ71PT32-S3 Compatibility

The following table lists the differences between the AJ71PT320and AJ71PT32-S3.
All items related to data transfer processing methods, data communication programs, etc., that are not listed in the following table are the same for both.

Item	AJ71PT32	AJ71PT32-S3	
		I/O dedicated mode	Extension mode
Equipment that may be connected	• Stand-alone remote I/O unit • Compact type remote I/O unit • AJ72PT35 type data link module • Partial refresh type remote I/O unit • MELSEC-F series PC • Mitsubishi FR-Z200 series transistorized inverter • Manifold solenoid valve		All items listed to left plus the following: • AJ35PT-OPB-M1 operating box • AJ35PT-OPB-P1 operating box • AJ35PTF-R2 RS-232C interface unit
Number of I/O points occupied by the master module	32		48
Initial data setting method	Set by the sequence program		Set by the sequence program and initial data ROM (The ROM is created using the SW□GP-MINIP type system floppy disk.)
Line error check setting (buffer memory address 4)	Not available	Available	
I/O refresh timing	3.2 to 3.9	3.2 to 3.9	3.5 to 18

(1) When the AJ71PT32-S3 is used in the I/O dedicated mode, sequence programs created for the AJ71PT32 may be used without any modification.

(2) The following modifications must be made to sequence programs created for the AJ71PT32 if they are to be used in the AJ71PT32-S3 in extension mode.
  (a) All setting except for the number of retries is set in the ROM which is then installed in the master module.
  (For information concerning initial data settings in the ROM, see the SW□GP-MINIP Operating Manual.)

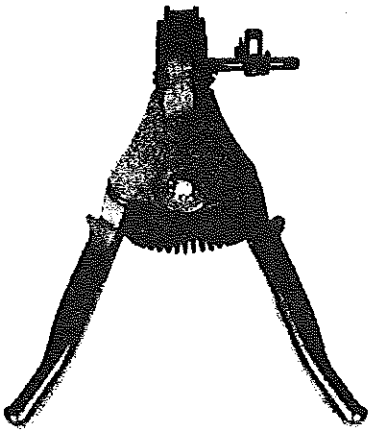
  (b) Since the number of I/O points occupied by the master module increases from 32 to 48, the device numbers (X, Y) of the I/O units after the master module must be modified.

APPENDIX 2 Optical Connector Manufacturing Method

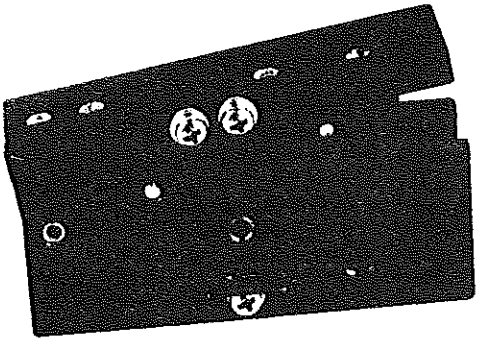
(1) Assembling tools

Description	Type	Quantity
Fiber stripper	ST 1000	1
Fiber cutter	CV 1000	1
Fiber clamper	FC 1000	1
Optical power tester	HT 101P	1
Cutter replacement blade	——	1

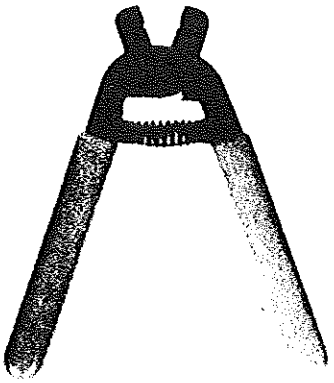
Fiber stripper



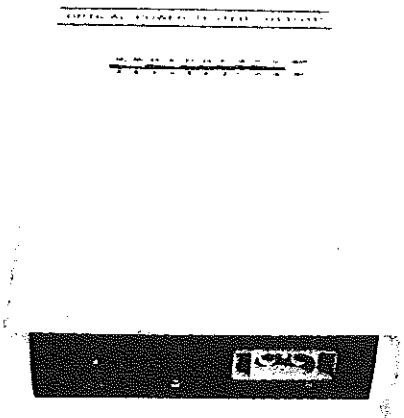
Fiber cutter



Fiber clamper



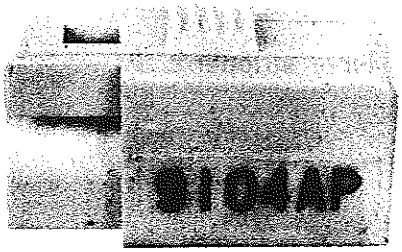
Optical power tester



(2) Connector parts

Description	Quantity
Housing	1
Ferrule	1
Sleeve	1

Housing

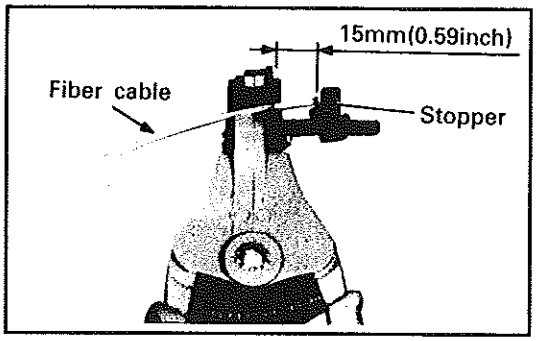


Ferrule

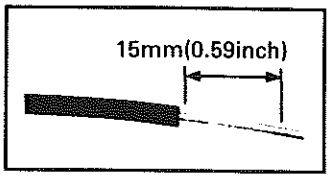
Sleeve

(3) Assembling procedure and notes on using tools

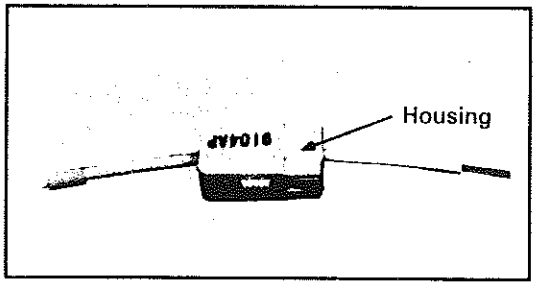
(a) Removing the outer sheath



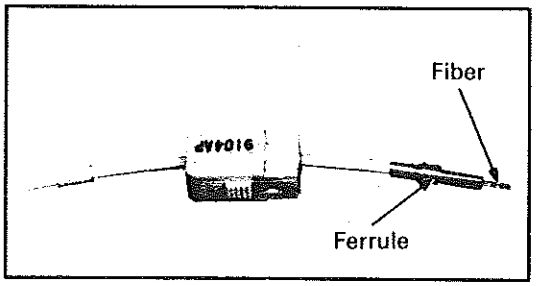
Set the end face of the optical fiber cable to the stripper stopper and strip the outer sheath approx. 15mm (0.59inch).



(b) Inserting the sleeve and housing

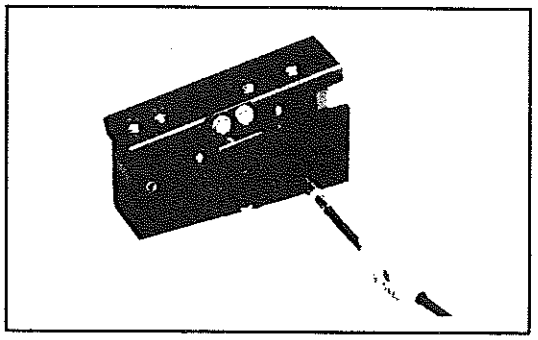


(c) Inserting the ferrule

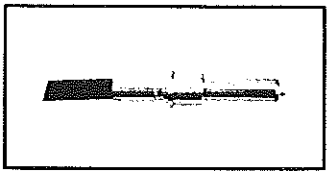


Insert the ferrule until the fiber comes out of the ferrule end and stops against the outer sheath.

(d) Cutting the fiber

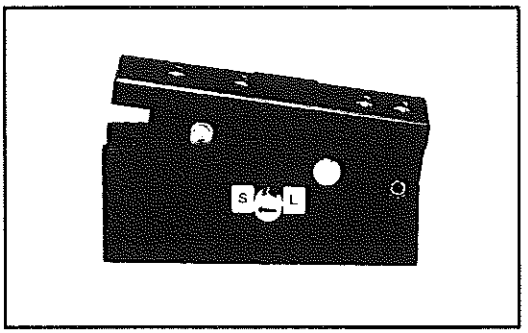


Insert the ferrule into the fiber cutter cut-off hole until it stops, and cut-off the fiber.



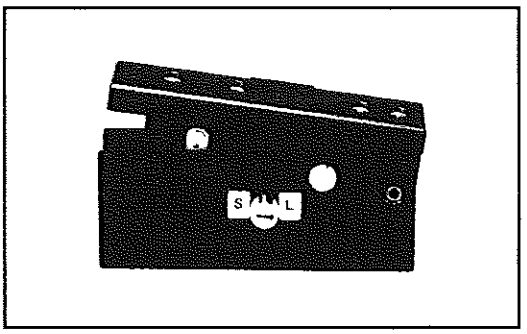
- The fiber is cut-off about 1mm (0.04inch) from the ferrule end.

(e) Switching the cable length select knob
(Cable length 1m(3.28ft) to less than 5m(16.4ft))



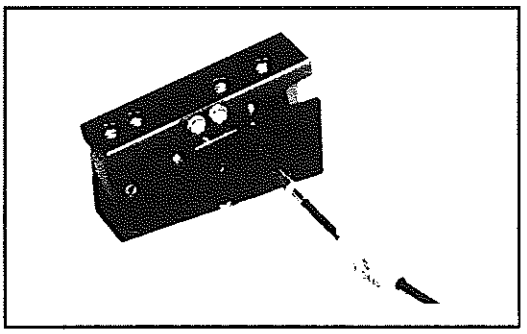
Push and turn the cable length select knob and set the arrow to "SHORT".

(Cable length 5m(16.4ft) and up)

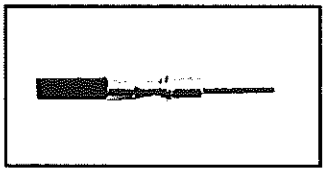


Turn the cable length select knob and set the arrow to "LONG".

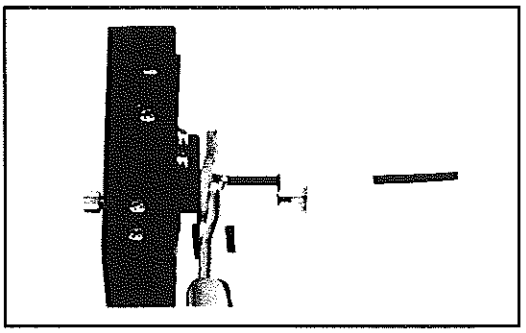
(f) Positioning the fiber end face



Insert the ferrule into the fiber cutter positioning hole until it stops. (Check that the fiber is not in the outside of the ferrule end.)

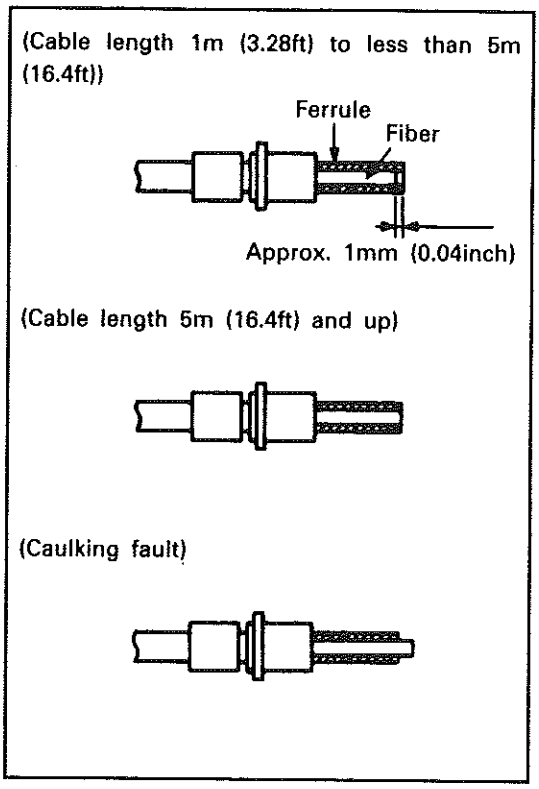


(g) Caulking the ferrule



With the ferrule in the state in step (f), caulk the ferrule with the fiber clamper.

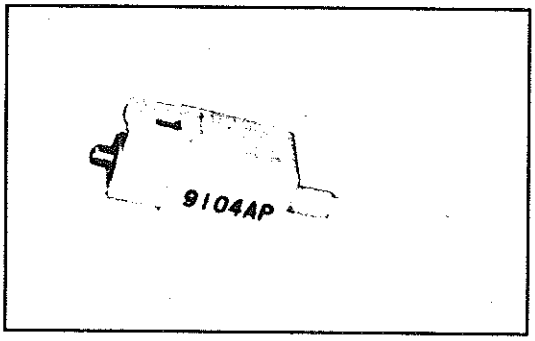
(h) Checking the ferrule end



Ensure that the fiber is not in the outside of the ferrule end. If the fiber is exposed, start the procedure all over again, or cut off or polish the protruding fiber with a knife, etc.

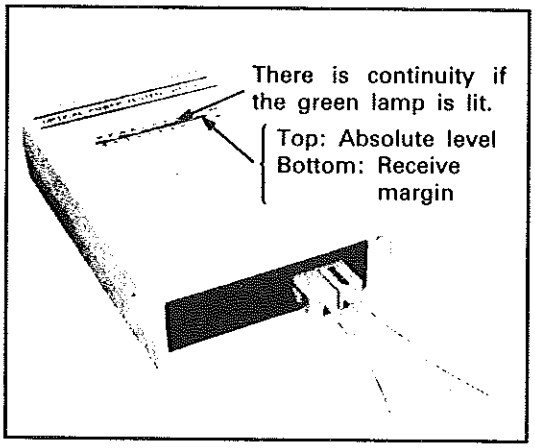
- If the knob was set to "SHORT" (for cable length 1m to less than 5m (16.4ft)), the fiber is fastened about 1mm (0.04inch) backward from the ferrule end.
- If the knob was set to "LONG" (for cable length 5m (16.4ft) and up), the fiber is fastened at the ferrule end.

(i) Overall assembly



Return the housing to the ferrule side and fasten it with the sleeve.

(j) Making optical continuity check



Insert the finished optical connector into the optical power tester and make optical continuity check.
The green lamp is lit if there is continuity.
However, the green lamp may be lit if the cable between 1m (3.28ft) and less than 5m (16.4ft) length has been assembled with the cable length select knob accidentally set to "LONG". In this case, communication error occurs because the receiving light level is too high. The end face checking in step (h) must be made.

APPENDIX 3 Communication Data Assignment Sheets

(1) Batch refresh communication data sheet

Buffer Memory Address	Remote I/O Station (Upper: b0 to 7 / Lower: b8 to 15)			Remarks	Buffer Memory Address	Remote I/O Station (Upper: b0 to 7 / Lower: b8 to 15)			Remarks
	Station number	I/O address	Device			Station number	I/O address	Device	
10	1	to	to		26	33	to	to	
	2	to	to			34	to	to	
1	3	to	to		7	35	to	to	
	4	to	to			36	to	to	
2	5	to	to		8	37	to	to	
	6	to	to			38	to	to	
3	7	to	to		9	39	to	to	
	8	to	to			40	to	to	
4	9	to	to		30	41	to	to	
	10	to	to			42	to	to	
5	11	to	to		1	43	to	to	
	12	to	to			44	to	to	
6	13	to	to		2	45	to	to	
	14	to	to			46	to	to	
7	15	to	to		3	47	to	to	
	16	to	to			48	to	to	
8	17	to	to		4	49	to	to	
	18	to	to			50	to	to	
9	19	to	to		5	51	to	to	
	20	to	to			52	to	to	
20	21	to	to		6	53	to	to	
	22	to	to			54	to	to	
1	23	to	to		7	55	to	to	
	24	to	to			56	to	to	
2	25	to	to		8	57	to	to	
	26	to	to			58	to	to	
3	27	to	to		9	59	to	to	
	28	to	to			60	to	to	
4	29	to	to		40	61	to	to	
	30	to	to			62	to	to	
5	31	to	to		1	63	to	to	
	32	to	to			64	to	to	

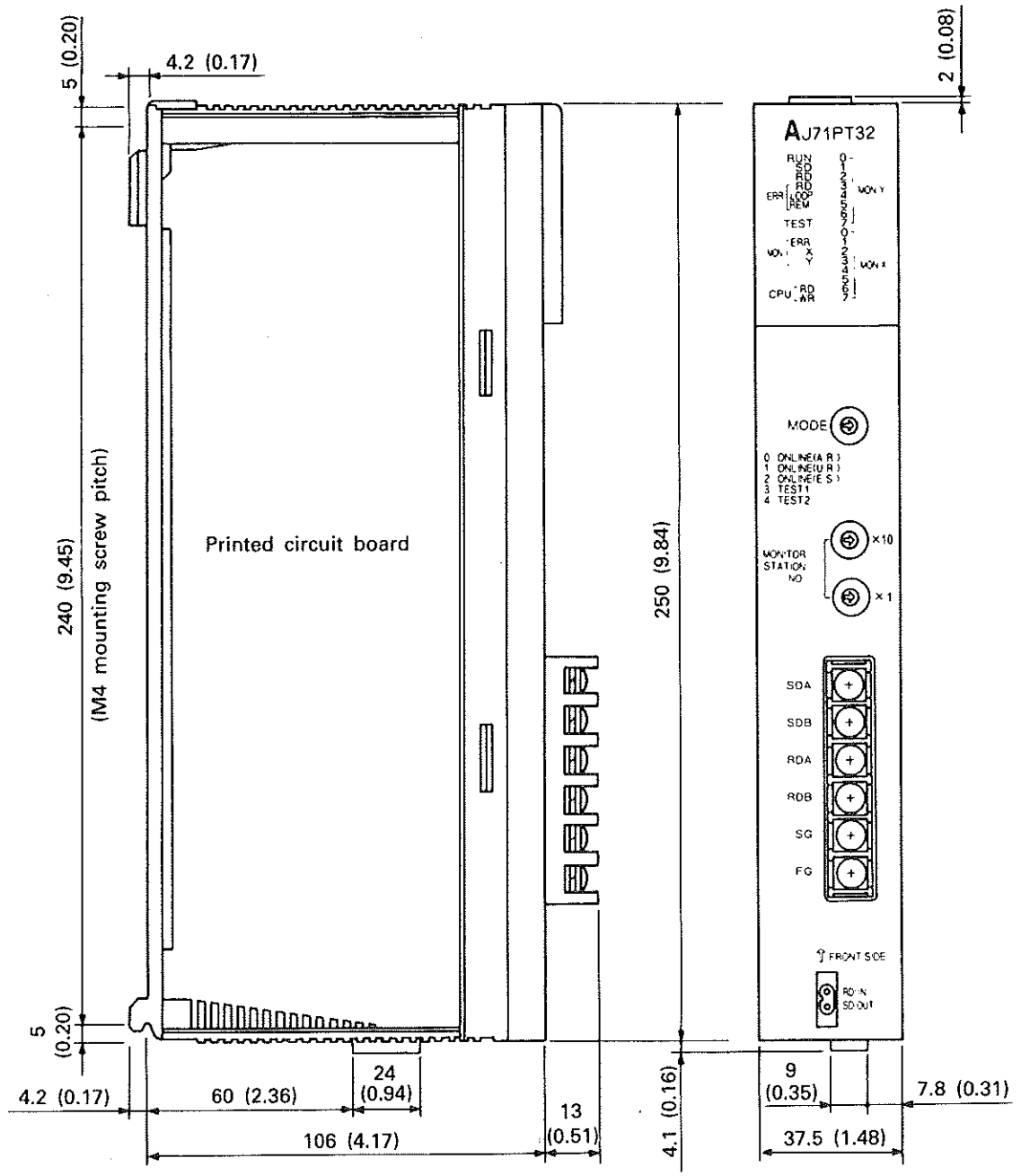
(2) Partial refresh station set data sheet

Buffer Memory Address	Set Data (Upper: Station number / Lower: Number of digits)	Addresses of I/O Data Location		Remarks
		Input data	Output data	
250 1		to	to	
2 3		to	to	
4 5		to	to	
6 7		to	to	
8 9		to	to	
260 1		to	to	
2 3		to	to	
4 5		to	to	
6 7		to	to	
8 9		to	to	
270 1		to	to	
2 3		to	to	
4 5		to	to	
6 7		to	to	
8 9		to	to	
280 1		to	to	

(3) Partial refresh communication data sheet

Buffer Memory Address	Remote I/O Station		Devices for Storing Receive Data	Remarks
	(Station number) − (number of digits)	I/O address		
0	−	0 to F	to	
1	−	0 to F	to	
2	−	0 to F	to	
3	−	0 to F	to	
4	−	0 to F	to	
5	−	0 to F	to	
6	−	0 to F	to	
7	−	0 to F	to	
8	−	0 to F	to	
9	−	0 to F	to	
0	−	0 to F	to	
1	−	0 to F	to	
2	−	0 to F	to	
3	−	0 to F	to	
4	−	0 to F	to	
5	−	0 to F	to	
6	−	0 to F	to	
7	−	0 to F	to	
8	−	0 to F	to	
9	−	0 to F	to	
0	−	0 to F	to	
1	−	0 to F	to	
2	−	0 to F	to	
3	−	0 to F	to	
4	−	0 to F	to	
5	−	0 to F	to	
6	−	0 to F	to	
7	−	0 to F	to	
8	−	0 to F	to	
9	−	0 to F	to	

APPENDIX 4 Dimensions



Unit : mm (inch)

IMPORTANT

The components on the printed circuit boards will be damaged by static electricity, so avoid handling them directly. If it is necessary to handle them take the following precautions.

(1) Ground human body and work bench.

(2) Do not touch the conductive areas of the printed circuit board and its electrical parts with any non-grounded tools etc.

Under no circumstances will Mitsubishi Electric be liable or 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 applications of this equipment, you must satisfy yourself as to its suitability for your specific application.

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