MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-A

User's Manual

PROFIBUS interface module type AJ71PB92

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MITSUBISHI ELECTRIC

REVISIONS

* The manual number is given on the bottom left of the back cover.

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INTRODUCTION

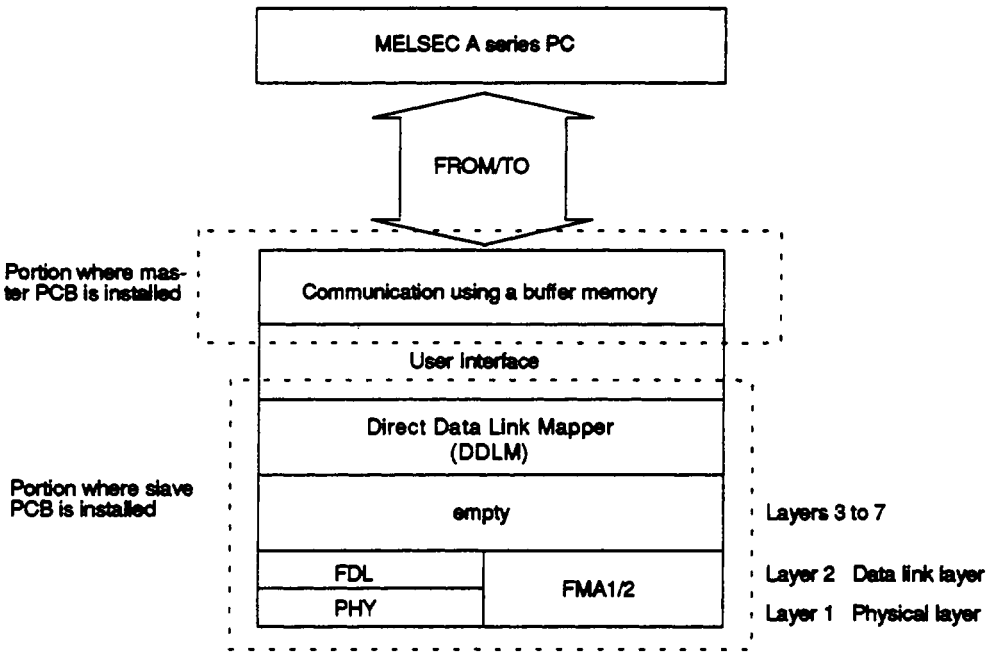
Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end User.

CONTENTS

1. GENERAL DESCRIPTION

This is the user's manual for the AJ71PB92 PROFIBUS-DP interface module (hereafter "AJ71PB92"), which is used to connect a MELSEC-A series programmable controller to a PROFIBUS-DP network.
The AJ71PB92 operates as a master station (class 1) in the PROFIBUS-DP network.

1.1 Software Configuration



The AJ71PB92 has a physical layer, data link layer, DDLM, and user interface that conform to PROFIBUS-DP, and communicates data with the PC CPU by using a buffer memory.
The main application of PROFIBUS-DP is networks that execute high-speed communication at the level of sensors and actuators, and the AJ71PB92 has been designed with this in mind: its functions are mainly related to data I/O with slave stations.

1.2 Features of the AJ71PB92

By setting parameters using the utility software package, the AJ71PB92 can be used as a PROFIBUS-DP master station (class 1).

(1) By using X and Y I/O signals and the buffer memory, the AJ71PB92 can exchange I/O data with slave stations.

(2) The network communication speed can be selected from among the following options by DIP switch setting: 9.6, 19.2, 93.75, 187.5, 500, 1500 kbps.

(3) The module's station number can be set with a rotary switch (1 or 2).

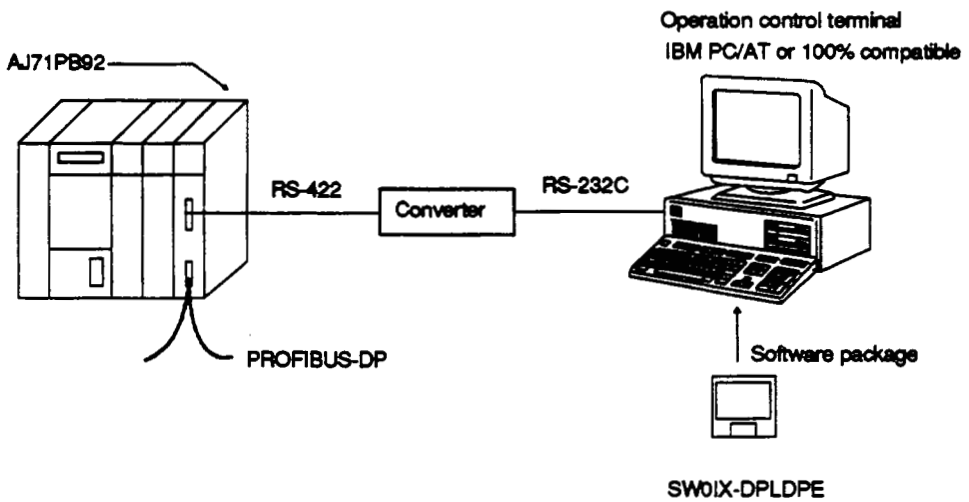
(4) By using X and Y I/O signals and the buffer memory, the AJ71PB92 can read fault information from slave stations.

(5) Self-diagnosis function.

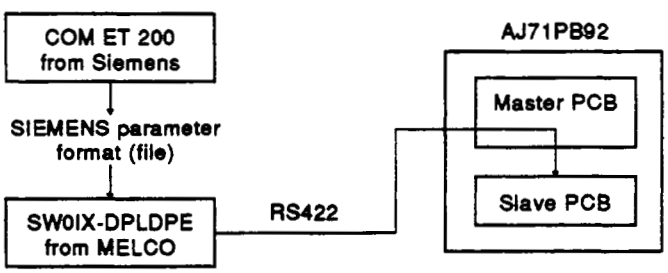
2. SYSTEM CONFIGURATION

2.1 Example System Configuration

An example configuration of a system including an AJ71PB92 is shown below. The AJ71PB92 has been developed as a building-block type communication module for use with MELSEC-A series equipment.
An IBM PC/AT or 100% compatible is used as the operation control terminal and a utility software package has been developed to run on it.



Parameter settings are made using the COM ET 200 software package from Siemens, and a parameter file is created. This file is transferred to the AJ71PB92 by using the SW0IX-DPLDPE loader package from Mitsubishi.



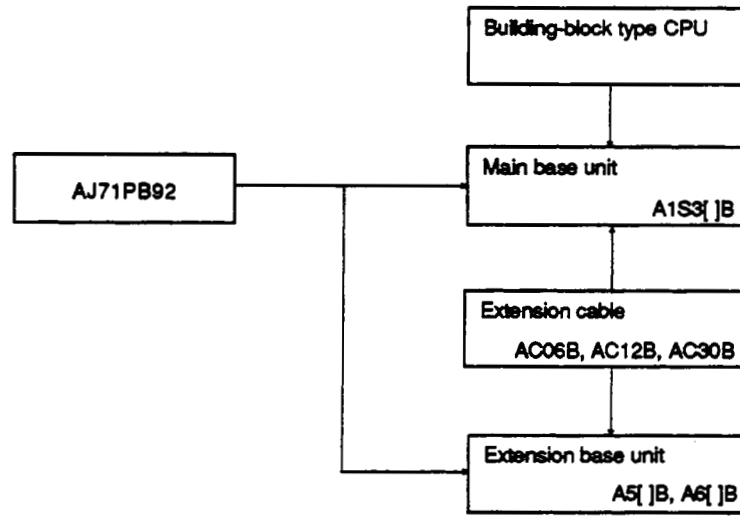
2.2 Applicable Systems

(1) The AJ71PB92 can be used with the following CPUs.

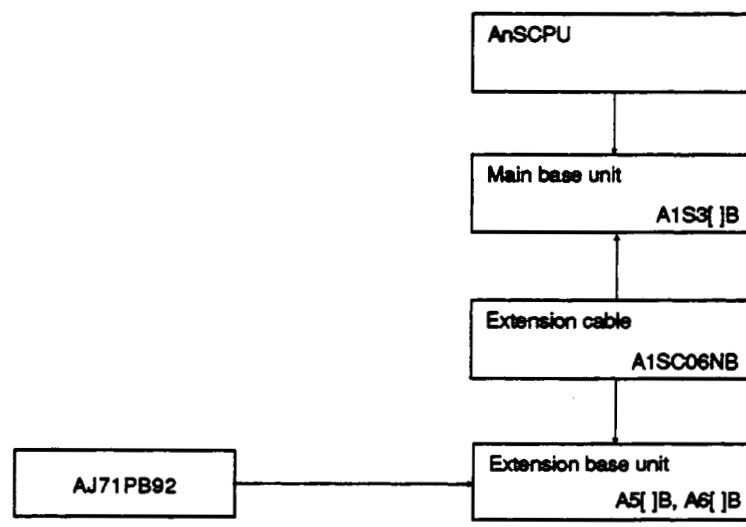
Applicable CPU	Number that can be Loaded
A0J2HCPU, A0J2HCPU P21/R21 A1SCPU, AISCPU-S1 A1SJCPU A2SCPU, A2SCPU-S1 A2ASCPU, A2ASCPU-S1 A1CPU, A1CPU P21/R21 A2CPU, A2CPU P21/R21 A3CPU, A3CPU P21/R21 A1NCPU, A1NCPU P21/R21 A2NCPU, A2NCPU P21/R21 A2NCPU-S1, A2NCPU P21/R21-S1 A3NCPU, A3NCPU P21/R21 A3HCPU, A3HCPU P21/R21 A3MCPU, A3MCPU P21/R21	Two
A2ACPU, A2ACPU P21/R21 A2ACPU-S1, A2ACPU P21/R21-S1 A3ACPU, A3ACPU P21/R21	Six

2.3 Overall Configuration

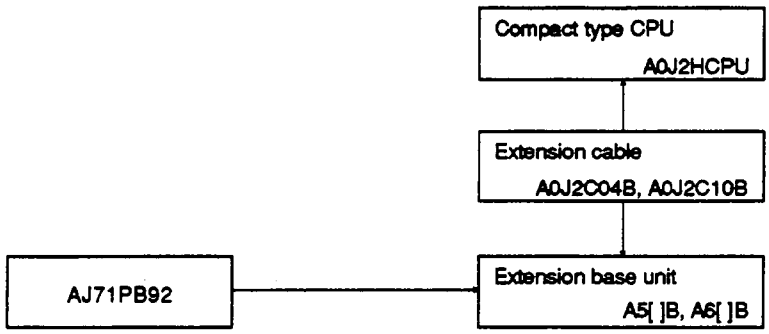
(1) When a building-block type CPU is used:



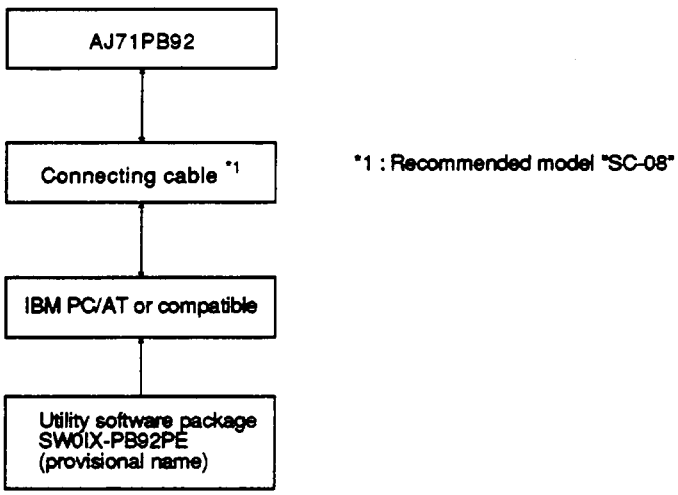
(2) With AnSCPU:



(3) When used with a compact type CPU:



(4) Peripheral device configuration



2.4 Cautions on System Configuration

The AJ71PB92 can be installed in any slot of the base unit, except for the following cases:

(1) Avoid installing the AJ71PB92 on an extension base unit that has no power supply module (A5[ ] type extension base units) since there is a possibility that the power supply capacity will be insufficient.
If you do install the AJ71PB92 on such an extension base unit, refer to the user's manual for the relevant CPU module for details on the appropriate power supply and other relevant information.

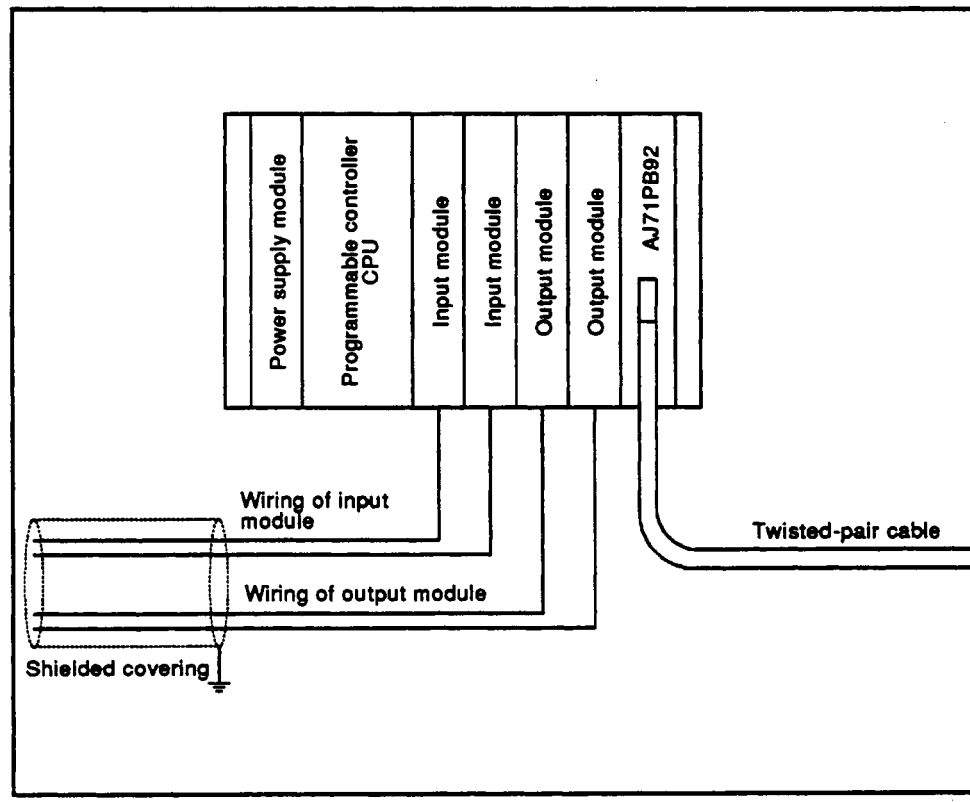
(2) Do not install the AJ71PB92 in the final slot of the 7th extension of an A3CPU.

2.5 Precautions Against Wiring

As one of the requirements to give full play to AJ71PB92's functions and make up the system with high reliability, it is necessary to have an external wiring unsusceptible to an influence of noise. Precautions against external wiring of AJ71PB92 is described below.

(1) Do not route the wire of AJ71PB92 close to or bundle it together with the main circuit and high-tension lines, or the load-carrying lines from other than the programmable controller. Otherwise, the module may be susceptible to an influence of noise and surge induction.

(2) The wires from the input/output modules of the programmable controller should be away from the communication cable of PROFIBUS-DS interface module as far as possible as shown in the figure below.



(3) Grounding

(a) When the PROFIBUS interface module is used, the FG and LG terminals of the power supply module of the programmable controller should basically be grounded.

(b) If communication cannot be performed after grounding because of abnormal voltage applied to the FG terminal, the module may be used without grounding.

3. SPECIFICATIONS

3.1 General Specifications

General specifications of PROFIBUS-DP Interface module are as shown below.

<table>
<tr><th>Item</th><th colspan="5">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="5">0 to 55 °C</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="5">-20 to 75 °C</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="5">10 to 90 % RH, no condensation</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="5">10 to 90 % RH, no condensation</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 57 Hz</td><td>———</td><td>0.075 mm</td><td rowspan="2">*1 10 times (1 octave/ 1 min.)</td></tr>
<tr><td>57 to 150 Hz</td><td>9.8 m/s^2(1G)</td><td>———</td></tr>
<tr><td>Shock resistance</td><td colspan="5">Conforms to JIS C 0912 {147 m/s^2(15G) x 3 times in 3 directions}</td></tr>
<tr><td>Noise resistance</td><td colspan="5">By noise simulator of 1500 V.P.P. noise voltage, 1 μs noise width and 25 to 60 Hz noise frequency.</td></tr>
<tr><td>Dielectric withstand voltage</td><td colspan="5">1500 VAC for 1 minute across batch of AC external terminals and ground</td></tr>
<tr><td>Insulation resistance</td><td colspan="5">5 MΩ or more with 500 VDC insulation resistance tester across batch of AC external terminals and ground</td></tr>
<tr><td>Operating atmosphere</td><td colspan="5">No corrosive gases, dust or oil mist.</td></tr>
<tr><td>Cooling method</td><td colspan="5">Self-cooling</td></tr>
</table>

REMARK

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

3.2 Performance Specifications

Item		Specifications	
Transmission specifications	Electrical standards and characteristics	Conforms to EIA-RS485.	
	Cable	Shielded twisted cable	
	Network configuration	Bus type (however, tree type when repeaters are used)*4	
	Communication protocol	Token passing (between masters) method Polling (between master and slave) method	
	Encoding method	NRZ	
	Transmission speed *1 Maximum transmission distance	Transmission speed (kbps)	Transmission distance (m/segment)
		9.6	1200
		19.2	
		93.75	
		187.5	1000
		500	400
		1500	200
	Maximum transmission distance	4800 m*2	
	Max. number of repeaters / network	Three *3	
	Max. number of stations / segment	32 stations	
	Max. number of slave / master station	60 stations	
	Number of connected nodes (number of repeaters)	32, 62 (1), 92 (2), 126 (3)	
	Transmissible data	32 bytes/station	
Number of occupying I/O points		32 points	
5 VDC internal current consumption		1.3 A	
Outside dimensions mm(inch)		250 x 37.5 x 120 (9.84 x 1.48 x 4.72)	
Weight kg(lb)		0.5 (1.1)	

REMARKS

*1: Accuracy of transmission speed: within ± 0.3 % (PROFIBUS Part 1)

*2: When the transmission speed is no greater than 93.75 kbps and 3 repeaters are used.

*3: Transmission distance (m(ft)/network) can be extended with the use of repeaters.
Transmission distance (m(ft)/network) = (Number of repeaters + 1) x
Transmission distance (m(ft)/segment)

*4: For the tree type of network configuration, see Fig.3.1.

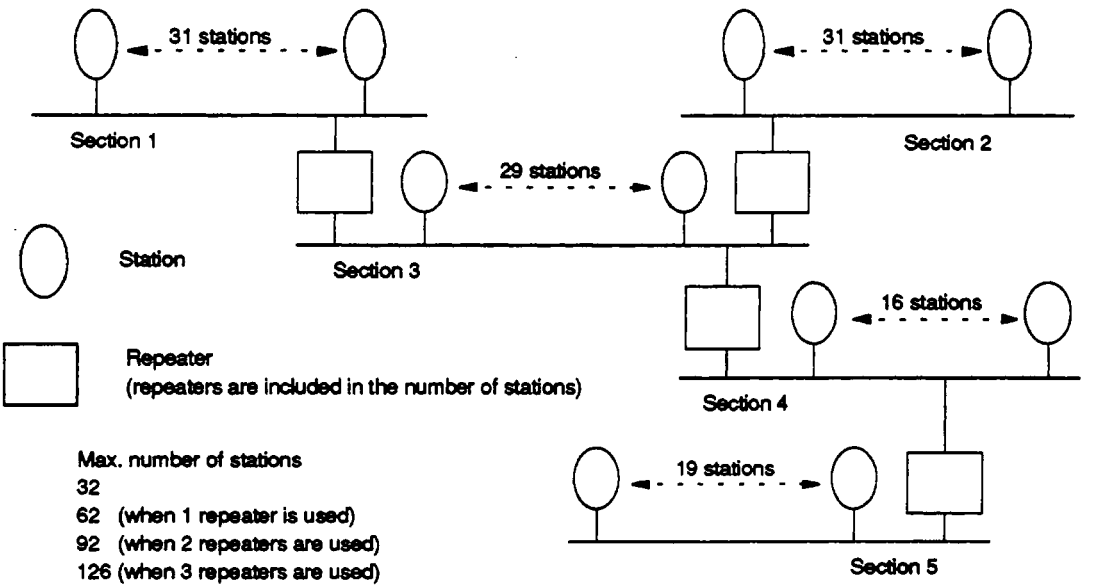
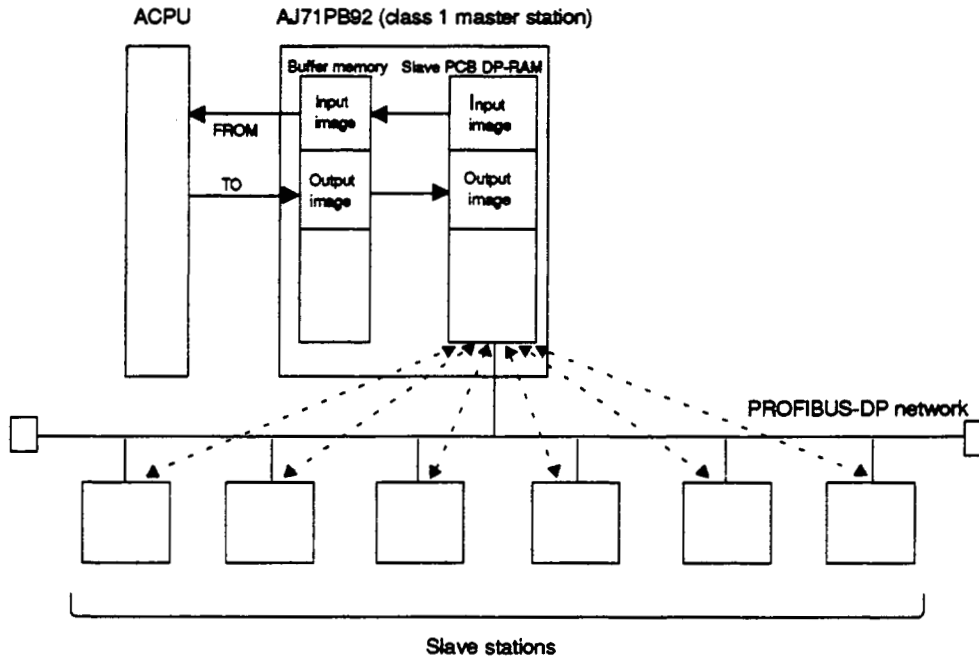


Fig. 3.1 Tree Type System Connection Example(3 Repeaters Used)

4. FUNCTIONS

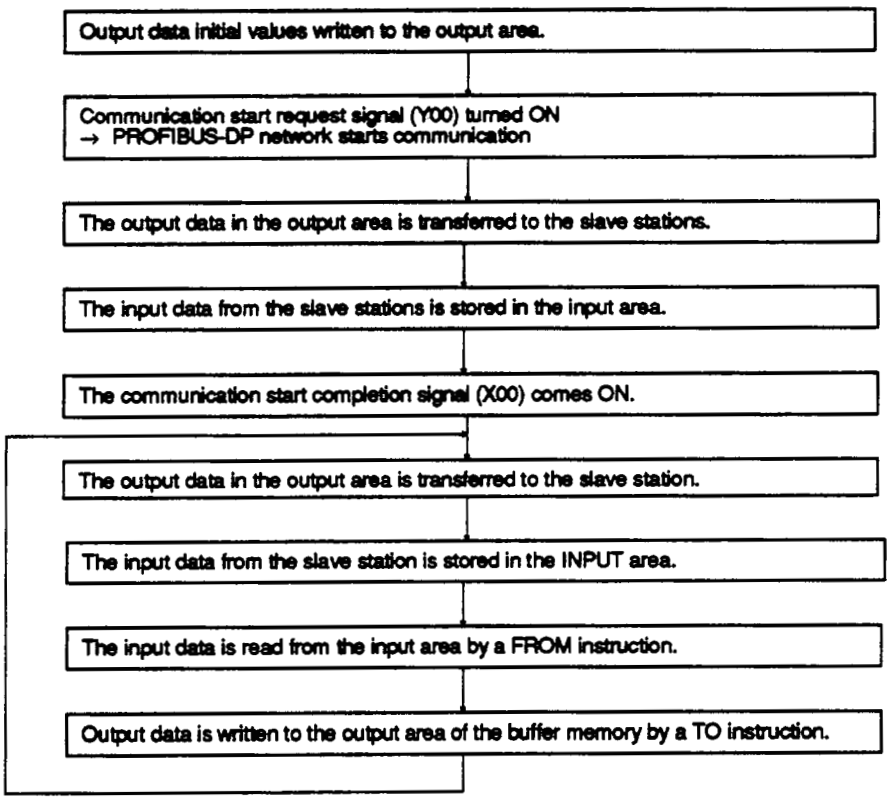
4.1 Communication with Slaves

The main function of the AJ71PB92 is the communication of I/O data with slave stations connected in the PROFIBUS-DP network. This communication is executed by reading from/writing to the input and output images in the buffer memory by using FROM/TO instructions. A summary of the communication function is presented in the figure below.



4.1.1 Communication flow

A flow chart for the communication of I/O data with slave stations is presented below.



4.2 Utility Functions

The utility functions are listed below.
A separate external specification for utilities is available.

No.	Mode	Function	Description
1	READ mode	Reading	Reads parameters from the AJ71PB92 and outputs them to the designated file.
2	WRITE mode	Writing	Writes parameters from the designated file to the AJ71PB92.
3	VERIFY mode	Verification	Vefifies the designated file against the parameters the at the AJ71PB92.

4.3 Input/Output Signales

4.3.1 List of I/O signals

The AJ71PB92 I/O signals with respect to ACPU are tabled below.

Direction of Signals: From the AJ71PB92 to the PC CPU		Direction of Signals: From the PC CPU to the AJ71PB92	
Device No.	Description	Device No.	Description
X00	Communication start completion signal	Y00	Communication start request signal
X01	Communication fault detection signal	Y01	Communication fault detection signal reset
X02	Communication fault area clear completion signal	Y02	Communication fault area clear request signal
X03 . . . . . X0C	Unusable	Y03	Communication fault area type selection
		Y04	Not used
		Y05 Y06	These devices are used by the system, so prohibited from being used.
		Y07 . . . . . Y0F	Not used
X0D	WDT error signal		
X0E X0F	Unusable.		
X10 . . . . . X1A	Unusable.	Y10 . . . Y19	Not used
X1B	Communication READY signal	Y1A Y1F	These devices are used by the system, so prohibited from being used.
X1C	Unusable.		
X1D	Module READY signal		
X1E X1F	Unusable.		

REMARKS

- WDT: Watch dog timer
- The area of Y not used can be used in place of internal relay M.

4.3.2 Detailed descriptions of I/O signals

(1) Communication start completion signal (X00)

(a) This signal comes ON after the communication start request signal (Y00) has been turned ON, provided the communication check with the slaves is normal.

(b) It goes OFF when the communication start request signal has been turned OFF, or when an error that stops communication occurs.

(c) It is used as an interlock when reading/writing I/O data.

(d) After turning Y00 ON, if it is not possible to start communication with one or more slave stations, error code 0172h occurs and the turning ON of X00 is delayed by the Power up delay time (refer to the COM ET 200 manual).

(2) Communication fault detection signal (X01)

(a) This signal comes ON when a communication fault has occurred.

(b) The RSP and ERR LEDs come on simultaneously.

(c) At this time, the error code and detailed data are stored in the communication fault area of the buffer memory.

(d) This signal goes OFF when the communication fault detection signal reset signal (Y01) comes ON.

(3) Communication fault area clear completion (X02)

(a) This signal comes ON after the communication fault area has been completely cleared by the turning ON of the communication fault area clear request signal (Y02).

(b) It goes OFF when the communication fault area clear request signal goes OFF.

(4) WDT error signal (X0D)

(a) This signal comes ON when a WDT error occurs.

(b) It does not go OFF until the module is reset or the power is switched ON/OFF.

(5) Communication READY signal (X1B)

(a) This signal comes ON when the communication start enabled status is established after the AJ71PB92 has started up and the module READY signal (X1D) has come ON.

(b) It goes OFF if an error that makes it impossible to continue communication occurs.

(c) It is used as an interlock when the communication start request signal (Y00) is turned ON.

(6) Module READY signal (X1D)

(a) This signal comes ON when the AJ71PB92 starts up.

(b) It goes OFF if the AJ71PB92 goes down.

(7) Communication start request signal (Y00)

(a) The user turns this signal ON to start communication with the slave modules.

(b) When this signal is turned ON, the AJ71PB92 executes a communication check with the slaves; if this is normal the communication start completion signal (X00) is turned ON and communication starts.

(c) When the signal is turned OFF, the AJ71PB92 ceases communication with the slaves and turns off the communication start completion signal.

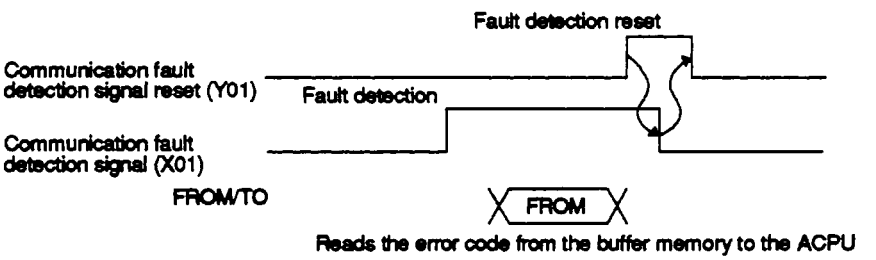
Note: Before turning on the communication start request signal, the output data initial values must be written to the buffer memory (if this is not done,the output data will be undefined when communication is started).

(8) Communication fault detection signal reset (Y01)

(a) This signal comes ON to reset the communication fault detection signal (X01) after the error code has been read from the buffer memory. When it comes ON, the RSP and ERR LEDs go off.

(b) It is turned OFF by the sequence program when the communication fault detection signal goes OFF.

(c) This signal is used in accordance with the sequence shown below.

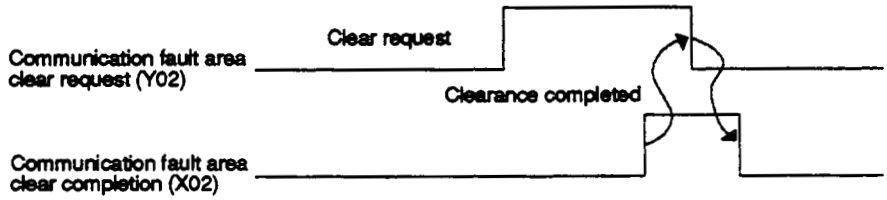


(9) Communication fault area clear request (Y02)

(a) This signal is turned ON to completely clear the communication fault area of the buffer memory.

(b) It is turned OFF by the sequence program when the communication fault area clear completion signal has come ON.

(c) This signal is used in accordance with the sequence shown below.



(10) Communication fault area type selection (Y03)

(a) Used to select the type of communication fautl area (ring type or fixed type). (See Section 4.4.2 (4))

(b) To select the ring type, this signal is set "OFF", and to select the fixed type, it is set "ON".

(c) This signal becomes effective when the module is started up and when the communication fault area clear request signal (Y02) comes ON.

4.4 Buffer Memory

4.4.1 Configuration of the buffer memory

The configuration of the buffer memory used for data communication with the PC CPU is shown below.

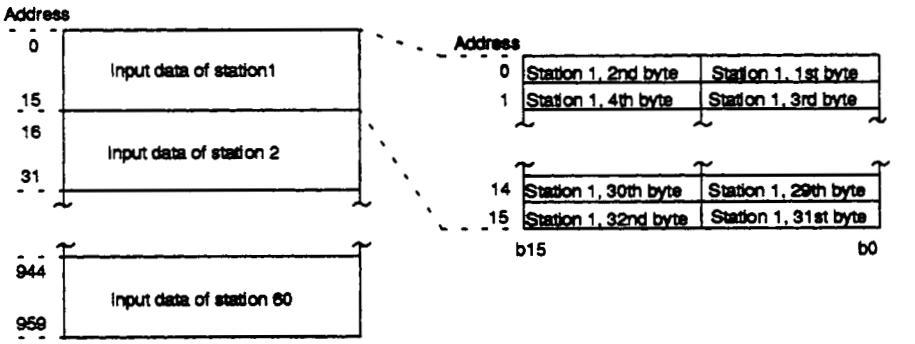
Address (decimal/hexadecimal) Units: words

0/ 0 959/ 3BF	INPUT area (Description) Area that stores the input data from the slaves.
960/ 3C0 1919/ 77F	OUTPUT area (Description) Area that stores the output data destined for the slaves.
1920/ 780 2039/ 7F7	Address information area (Description) Area that displays the buffer memory address allocation information.
2040/ 7F8 2079/ 81F	Communication fault area (Description) Area that displays fault information from the slaves.
2080/ 820	Slave fault information cancel area (Description) Area that stores data to mask the slave fault information.

4.4.2 Detailed description of buffer memory contents

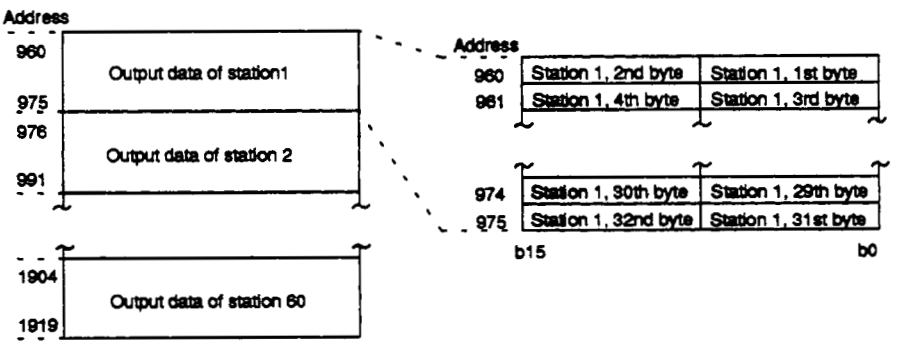
(1) INPUT area

This area stores the input data from slave stations.
The allocation per station is fixed at 32 bytes (16 words), and allocations for a total of 60 stations can be made.
The configuration of the INPUT area is shown below.



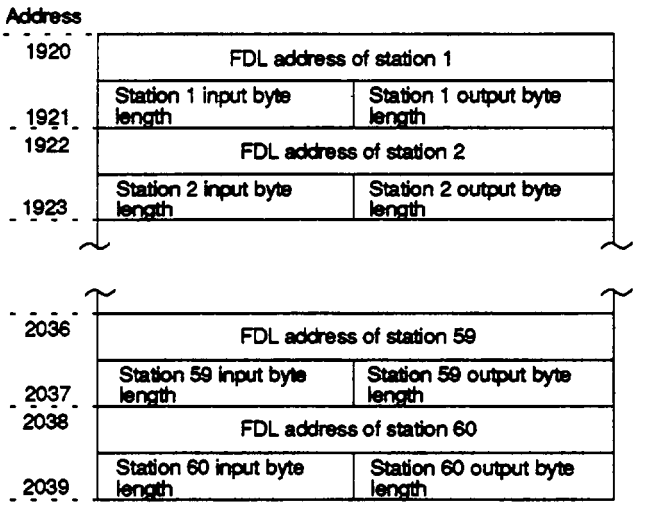
(2) OUTPUT area

This area stores the data to be output to slave stations.
The allocation per station is fixed at 32 bytes (16 words), and allocations for a total of 60 stations can be made.
The configuration of the OUTPUT area is shown below.



(3) Address information area

This area indicates the FDL address, input byte length, and output byte length, for each slave station.
The configuration of the address information area is shown below.



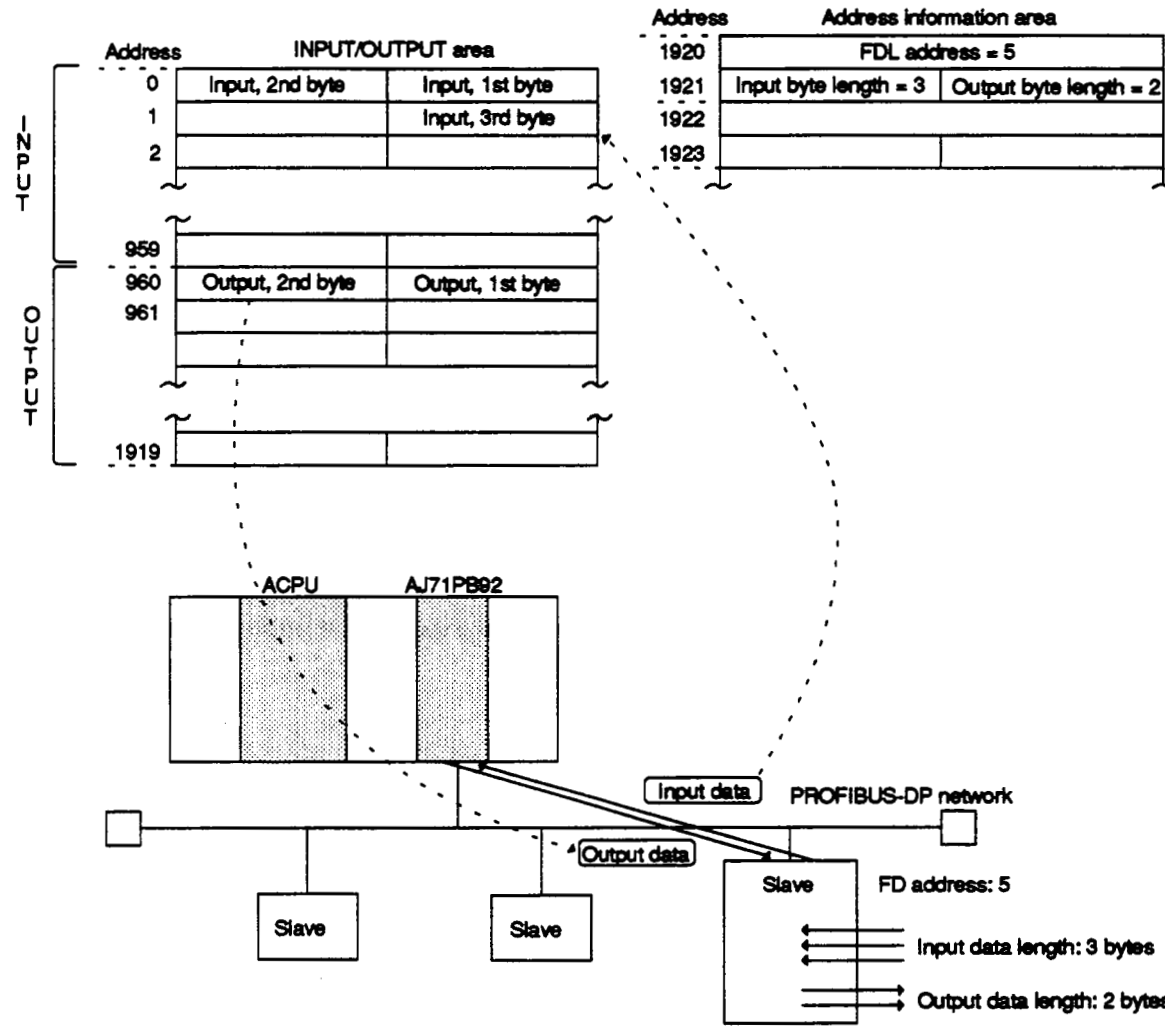
REMARKS

*1 Stations for which no allocation is made have the FDL address set as FFFFh and the input/output byte length set as FFh.

*2 If the input or output byte length of a station for which an allocation has been made is "0", "0" is stored for the byte length.

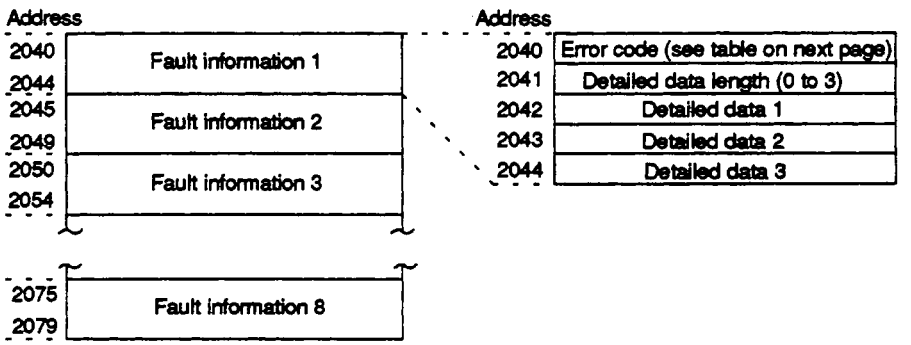
The AJ71PB92 reads the FDL address of the set slave station and I/O data length from the parameter file stored in the E^2PROM, and stores them in the address information area in the buffer memory.

As the actual location where I/O data is stored, 32 bytes each (fixed) of input and output are allocated to one slave station, and their various I/O data is stored in the corresponding buffer memory area.



(4) Communication fault area

This area stores the details of any fault that occurs while the AJ71PB92 is engaged in communication. For this area, either the fixed type or ring type can selected by switching the communication fault area type selection signal (Y03) ON or OFF.
The basic configuration of the area is the same whether the fixed type or ring type is selected: as shown in the figure below, it stores a total of a items of fault information, each comprising an error code, detailed data length, and detailed data.
In the case of the ring type, the items are always stored in other, with the latest fault information at the head.
In the case of the fixed type, when 8 items have been stored, items 2 through 8 are fixed and the next time a fault occurs only the head item changes.
In the case of both types, then the communication fault area clear request signal (Y02) comes ON, all fault information is cleared.
When the communication fault detection signal reset signal (Y01) comes ON, the communication fault detection (X01) goes OFF, but the contents of the communication fault area are retained.
The configuration of the communication fault area shown below.



The error codes are tabled below.

Error Code	Meaning	Detailed Data	Meaning	Communi-cation Status	Remedy
0172h	At least one station cannot be addressed	—	—	Δ	Check the communication line/slave status/parameters.
0200h	Slave fault infromation received	*1	*1	Δ	*1
1120h	Invalid slave parameter	FFh	60 or more slave stations allocated	x	Check the parameters
1121h	Invalid parameter allocation	00	System parameter error	x	Check the parameters
		01h	Bus parameter error		
		02, 04h	General parameter error		
1150h	Communication H/W error	01h	Operating system error	x	eset the module or turn the power ON/OFF. If this does not work, contact your local service center.
		02h	RAM error		
		03h	MPU error		
		04h	General H/W error		
		05h	No communication H/W response		
1173h	Baud rate setting error (with multiple masters), or cable error	—	————	x	Check the parameters/communi-cation line.
1181h	Communication initialization or start/stop not possible	01h	Communication error in the network	x	Check the communication line

*1 See next page

Δ : Indicates an error which does not stop communication.
x : Indicates an error that stops communication.

Note: When communication is stopeed, all slave outputs are set to "0".

When slave fault information is generated (error code = 0200h), it is stored as the detailed data. The configuration of the communication fault area at this time is shown below.

Error code = slave fault information generated	
Detailed data length = 3	
Master address *2	Slave address *3
Fault information	
Slave ID *4	

*2 FDL address of the master station that controls the slave station where the fault information was generated
*3 FDL address of the slave station where the fault information was generated
*4 ID number assigned to each slave in accordance with PNO recommendations

The fault information is expressed as a 16-bit bit string: when a fault occurs, the corresponding bit in this string is set.
The fault information is summarized in the table below.

Bit	Meaning	Communication Status	Remedy	Set Station
15	Controlled by anoter master station	Δ	Check the master station that allocated the parameters.	Master
14	Parameters sent from the master station are invalid.	Δ	Check the parameters.	Slave
13	Invalid response from slave station	Δ	Check the slave status.	Master
12	Unsupported function requested of the master station	Δ	Check the slave specifications.	Slave
11	0 (fixed)	Not used	————	Slave
10	Environment data received from master station does not match data at slave.	Δ	Check the slave parameters.	Slave
9	Slave not ready for communication	Δ	Check the slave status/communication line.	Slave
8	Communication with slave not possible	Δ	Check the slave status/communication line.	Master
7	Cyclic communication error due to parameter settings	Δ	Check tha master station that allocated the parameters.	Master
6	0 (reserve)	—	————	Slave
5	0 (fixed)	Not used	————	Slave
4	0 (fixed)	Not used	————	Slave
3	0 (fixed)	Not used	————	Slave
2	0 (fixed)	—	————	Slave
1	Diagnostic data read request	Δ	Check the slave status.	Slave
0	Parameter allocation request from slave	Δ	Load the parameters again.	Slave

Δ : Indicates an error which does not stop communication.

(5) Slave fault information cancel area

This area stores values to mask the slave fault information (i.e., detailed data 2 of error code 0200h).
If slave fault information for which the corresponding bits in this area are set to "1" is generated, neither the slave fault area information detection signal (X01) nor the RSP.ERR LED will come ON. In addition, the fault information will not be stored in the fault information area.
The default value is 0201h.
This 0201h fault information can occur in normal situations and this is why it masked.

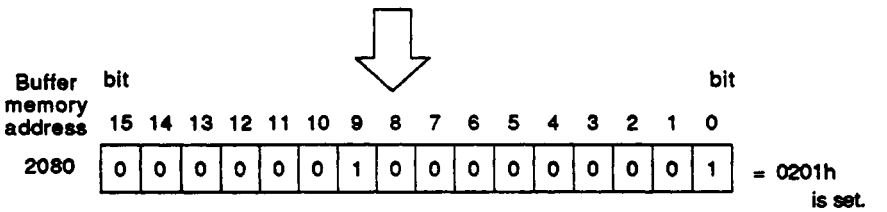
Address	b15 ... b0
2080	Slave fault information masking value

Example:

Slave fault information

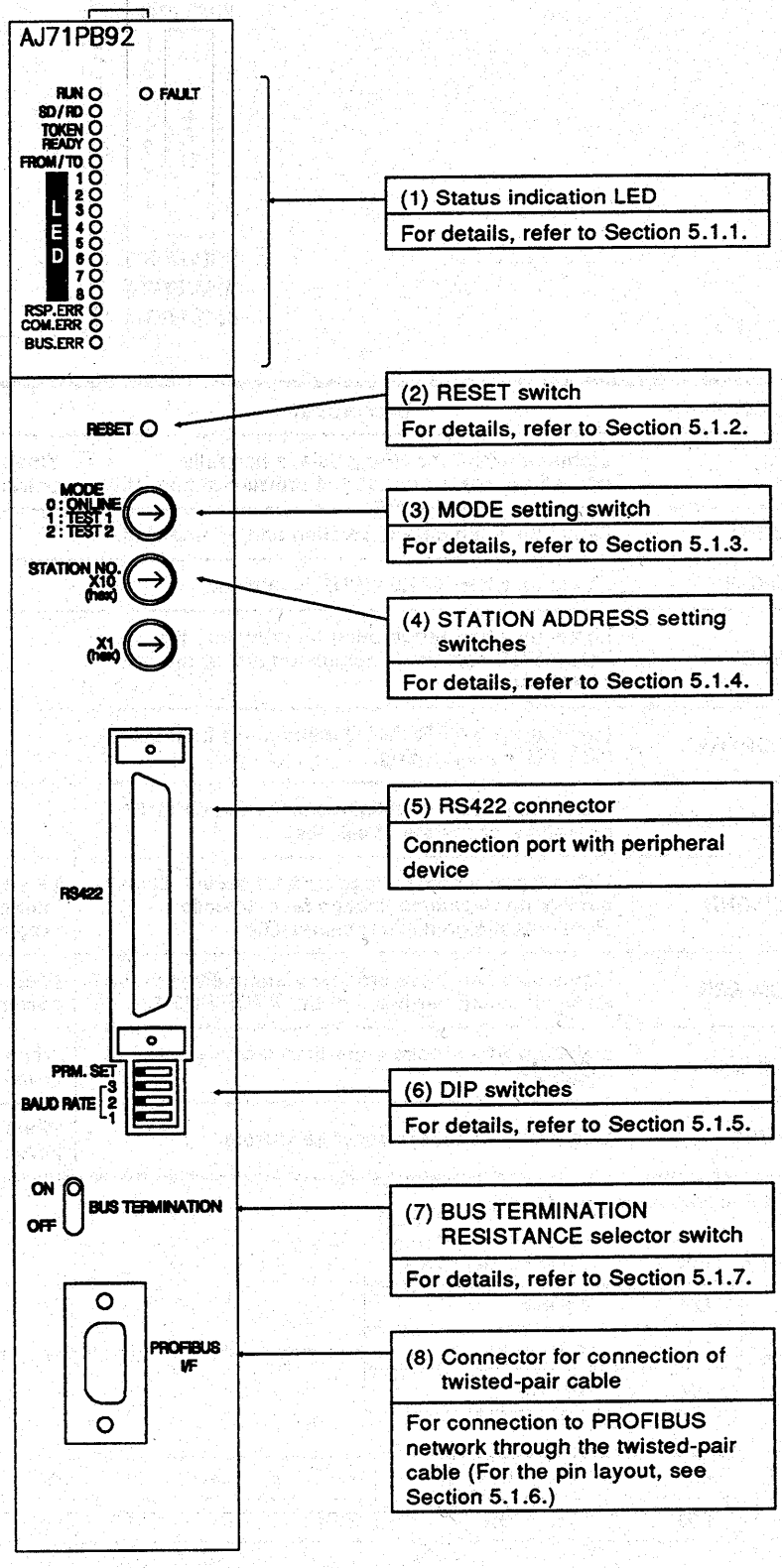
Bit	Meaning
15	Controlled by anoter master station
14	Parameters sent from the master station are invalid.
13	Invalid response from slave station
12	Unsupported function requested of the master station
11	0 (fixed)
10	Environment data received from master station does not match data at slave.
9	Slave not ready for communication
8	Communication with slave not possible
7	Cyclic communication error due to parameter settings
6	0 (reserve)
5	0 (fixed)
4	0 (fixed)
3	0 (fixed)
2	0 (fixed)
1	Diagnostic data read request
0	Parameter allocation request from slave

Situation when this fault information is masked

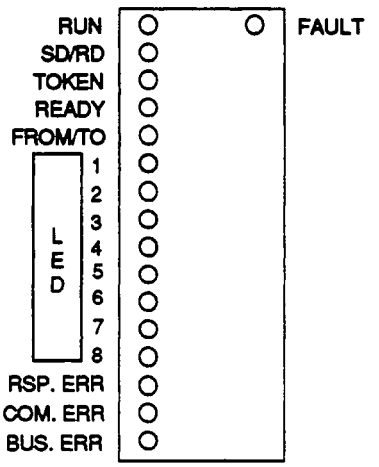


5.1 Nomenclature of Component

This section gives the names of each of the components of the AJ71PB92, and explains how to use them.
The external view is presented below.



5.1.1 LED



LED Name	Description	Corrective Action
RUN	Lights up when the I/F module is normally operating. Goes out due to hardware abnormality.	When out, reset the module or switch the power ON/OFF.
SD/RD	Lights up when data is sending and/or receiving.	———
TOKEN	Lights up when TOKEN BUS is retained.	———
READY	Lights up when preparation for entry into the PROFIBUS network is completed and at the time of entrance.	———
FROM/TO	Lights up when FROM/TO instructions from the PC CPU are executing.	———
LED1 to LED8	Indicates a state of initialization during ONLINE operation, or a state of self-test.	———
RSP.ERR	Lights when a communication fault occurs. Goes out when the communication fault detection signal reset signal (Y01) comes ON.	When lit, read the communication fault information with a peripheral device or ladder program.
COM.ERR	Lights up when there are any abnormalities at the communication hardware of the PROFIBUS-DP.	When lit, reset the module or switch the power ON/OFF.
BUS ERR.	Lights up when those other than memory area are accessed.	When lit, reset the module or switch the power ON/OFF.
FAULT	Lights up when there occur any errors.	When lit, reset the module or switch the power ON/OFF.

*1: Status display when ONLINE

LED1, 2	Station address display
LED3, 4	Not used
LED5 to 7	Baud rate display
LED8	Not used

LED1	ON	OFF
LED2	OFF	ON
Station address	1	2

LED5	OFF	ON	OFF	ON	OFF	ON	OFF	ON
LED6	OFF	OFF	ON	ON	OFF	OFF	ON	ON
LED7	OFF	OFF	OFF	OFF	ON	ON	ON	ON
Baud rate	9.6	19.2	93.75	187.5	500	1500	Not used	

(Units: kbps)

Note: If the station address is set to a value other than 1 or 2, LEDs 1 to 4 all light.

5.1.2 RESET switch

The RESET switch of the AJ71PB92 is described.

When this switch is pressed, all operations within the PROFIBUS interface such as communication processing are interrupted and initialization is carried out. The RESET switch is used when initialization is required to start up the network. The switch has such a structure as difficult to be pressed erroneously during communication. The RESET switch is operated by pressing with the end of a small screwdriver.

NOTE

The RESET switch on the PC CPU cannot be used to initialize the PROFIBUS interface.

5.1.3 MODE switch

Used principally to switch between the ONLINE and SELFTEST status.

SW No.	Mode	Test Item				Switch Marking
		C286CPU, PIC, PIT TEST	MEMORY TEST		Slave PCB SELF TEST	
			DRAM	Daughter's DP-RAM		
0	Normal operation	—	—	—	—	ONLINE
1	Internal diagnosis 1	O	O	O	—	TEST1
2	Internal diagnosis 2	O	—	—	O	TEST2

5.1.4 Station address setting switches

Used to set the addrerss of the host station. There are two rotary switches (1 byte).

Set Value (hex.)	Application	Remarks
00 to 7D	Station Address	
7E to FF	not used	If set, an error is indicated by the LRDs. *1

*1 LEDs 1 through 4 light.

5.1.5 DIP switches (4 bits)

Used to select the operating status (1 bit):

Face Plate Marking	ON (when set)	OFF (during normal operation)
PRM.SET	Parameter setting (non-operational status)	Operational status

Also used to select the baud rate (3 bits):

Transmission Speed		SW3	SW2	SW1	Remarks
0	9.6 kbps	OFF	OFF	OFF	
1	19.2 kbps	OFF	OFF	ON	
2	93.75 kbps	OFF	ON	OFF	
3	187.5 kbps	OFF	ON	ON	
4	500.0 kbps	ON	OFF	OFF	
5	1.5 Mbps	ON	OFF	ON	
6	—	ON	ON	OFF	Factory setting
7	—	ON	ON	ON	If set, an error is indicated by the LEDs. *2

*2 LEDs 5 to 8 are lit

Note: These switch settings become valid when the power is turned on or the module is reset.

5.1.6 PROFIBUS-DP interface (connector)

A D-Sub 9-pin, female connector is used.

- Pin assignments

Pin No.	Symbol	Name	Application
1		SHIELD	Shield, Protective Ground
2		RP	Reserved for Power
3	A/A'	RxD/TxD-A	Receive/Transmit-Data-A
4		CNTR-A	Control-A
5	C/C'	DGND	Data Ground
6		VP	Voltage-Plus
7		RP	Reserved for Power
8	B/B'	RxD/TxD-B	Rrceive/Transmit-Data-B
9		CNTR-B	Control-B

5.1.7 TERMINATOR switch

The setting of this switch determines whether or not the terminal resistors built into the module (1/2W 120 Ω × 2), are connected or not.
(Terminal resistors must be connected at the stations at each end of the PROFIBUS-DP segment.)

Switch Marking	ON	OFF
TERMINATOR	Terminal resistors connected	Terminal resistors disconnected (factory setting)

5.2 Self Diagnosis

This section describes the procedure for entering the self diagnosis mode and the LED indications during self diagnosis.

5.2.1 Internal diagnosis

Internal diagnosis is automatically executed on setting the MODE switch to 1-2 and starting up the module (switching on the power or resetting).
The table below shows the correspondence between the statuses of LEDs S1 to S8 and the test being performed in internal diagnosis.

MODE Switch No.		Meaning		S8	S7	S6	S5	S4	S3	S2	S1
1	2										
O	O	MPU test	During test	O	O	O	O	O	O	●	●
			Error	●	O	O	O	O	O	●	O
O	O	Timer test	During test	O	O	O	O	O	●	O	●
			Error	●	O	O	O	O	●	O	O
O	O	Interrupt test	During test	O	O	O	O	O	●	●	●
			Error	●	O	O	O	O	●	●	O
O	×	Slave PCB 2 port RAM test	During test	O	O	O	O	●	O	O	●
			Error	●	O	O	O	●	O	O	O
O	×	DRAM test	During test	O O	O O	O O	O O	● ●	O ●	● O	● ●
			Error	●	O	O	O	●	●	●	O
×	O	Slave PCB self test	During test	O	O	O	●	●	O	●	●
			Error	●	O	O	●	●	O	●	O

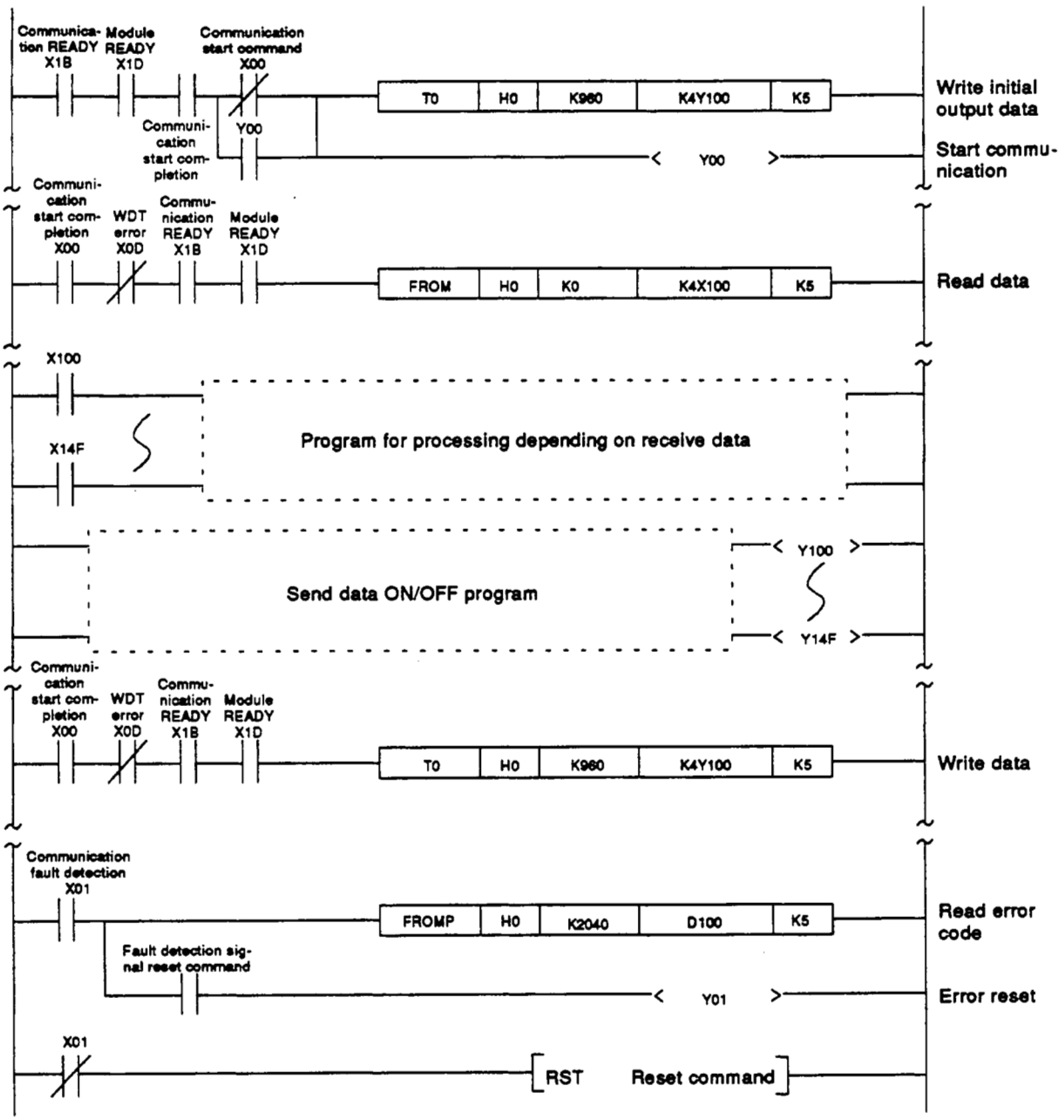
O : Executed
X : Not executed

● : ON
O : OFF

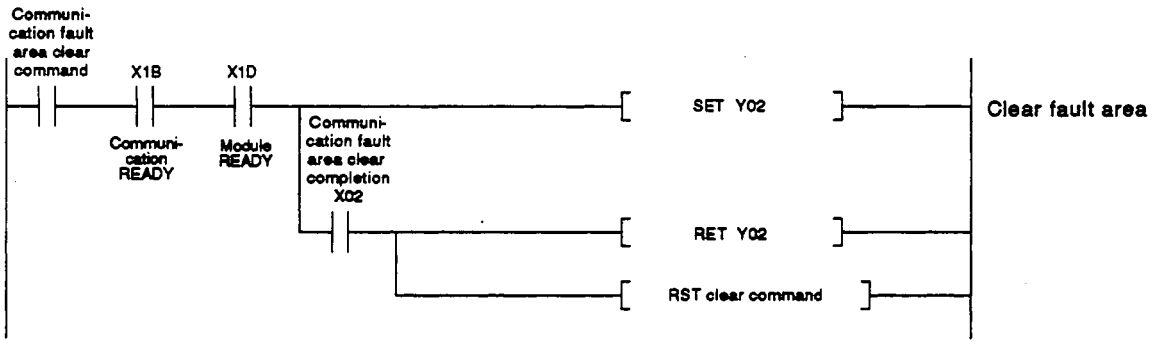
6. PROGRAMMING

A programming example is presented below.
In this example, it is assumed that the AJ71PB92 is loaded in slot No.0 of the main base unit.

6.1 Data I/O to/from the Slave

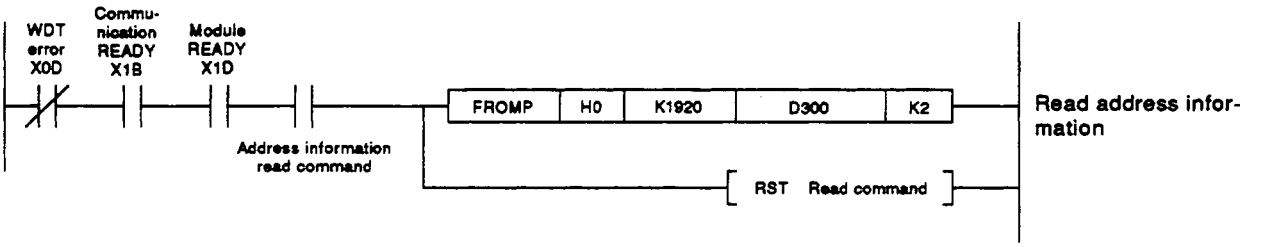


6.2 Communication Fault Area Clear



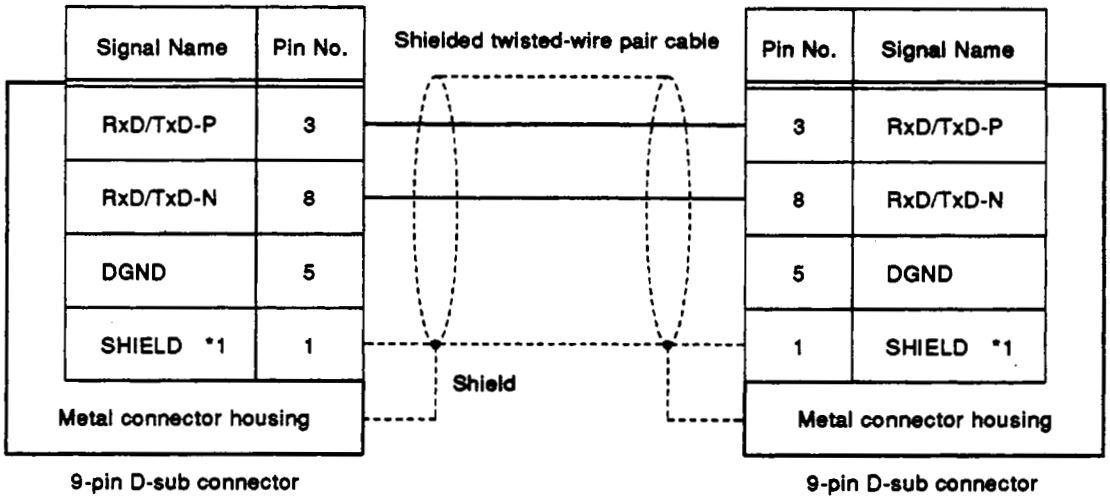
6.3 Address Information Read

Example: Reading the address information of station 1



APPENDIX 1 COMMUNICATION CABLE

The communication cable specifications required by PROFIBUS-DS are shown below.



IMPORTANT

(1) Design the configuration of a system to provide an external protective or safety inter locking circuit for the PCs.

(2) 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.

(a) Ground your body and the work bench.

(b) Do not touch the conductive areas of the printed circuit board and its electrical parts with 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.

MITSUBISHI ELECTRIC AUTOMATION, INC.
500 CORPORATE WOODS PARKWAY • VERNON HILLS, ILLINOIS 60061

IB(NA) 66569

5.1 Nomenclature of Component

This section gives the names of each of the components of the AJ71PB92, and explains how to use them.
The external view is presented below.