MITSUBISHI ELECTRIC

MELSEC A-Series

PROGRAMMABLE CONTROLLER

User´s Manual

Art.-No.: 44677 – 941220 – IB 66450-A

Data link module type A1SJ71AP21/R21

MITSUBISHI ELECTRIC EUROPE GMBH
INDUSTRIAL AUTOMATION

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.

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1. GENERAL DESCRIPTION

This manual describes the specifications, parts identification and self diagnosis function of the A1SJ71AP21/R21 data link module (hereinafter called the "A1SJ71AP21/R21") to be used with the MELSEC-A series MELSECNET data link system.

(1) The A1SJ71AP21/R21 can be used as the master station in the second tier, the local station in the second tier, and the local station in the third tier.

(2) • The A1SJ71AP21 is connected using fiber optic cable to the MELSECNET data link system.

• The A1SJ71AR21 is connected using coaxial cable to the MELSECNET data link system.

(3) The A1SJ71AP21/R21 can be used with the MELSECNET mode, MELSECNET composite mode, and MELSECNET II mode.

(4) Refer to the manual mentioned below for details of the MELSECNET data link system.

MELSECNET, MELSECNET/B Data link system
Reference manual (IB-66350)

(5) Applicable CPUs: A1SCPU (S1), A52GCPU (T21B)

(6) Only one A1SJ71AP21/R21 module can be installed per PC CPU module.

2. SPECIFICATIONS

2.1 General Specifications

The table below shows the general specifications of the data link system.

Table 2.1 General Specifications

Item	Specifications				
Operating ambient temperature	0 to 55°C				
Storage ambient temperature	–20 to 75°C				
Operating ambient humidity	10 to 90% RH (No condensation)				
Storage ambient humidity	10 to 90% RH (No condensation)				
Vibration resistance	Conforms to *JIS C 0911	Frequency	Acceleration	Amplitude	Sweep Count
		10 to 55 Hz	–	0.075 mm (0.003 in)	10 times **(1 octave /minute)
		55 to 150 Hz	9.8 m/s^2 (1 g)	–	
Shock resistance	Conforms to JIS C 0912 (98 m/s^2 (10 g) x 3 times in 3 directions)				
Noise durability	By noise simulator of 1500 Vpp noise voltage, 1 μs noise width and 25 to 60 Hz noise frequency				
Dielectric withstand voltage	1500 VAC for 1 minute across AC external terminals and ground 500 VAC for 1 minute across DC external terminals and ground				
Insulation resistance	5 MΩ or larger by 500 VDC insulation resistance tester across AC external terminals and ground				
Grounding	Class 3 grounding; Ground to the panel if proper grounding is not available.				
Operating atmosphere	Free of corrosive gases. Dust should be minimal.				
Cooling method	Self-cooling				

REMARK

The term "octave" (marked with two asterisks) describes a change from an initial frequency to half or double that frequency.
For example, the following changes are referred to as 1 octave:

10 Hz to 20 Hz
20 Hz to 40 Hz
40 Hz to 20 Hz
20 Hz to 10 Hz

Note: *JIS : Japanese Industrial Standard

2.2 Performance Specifications

This section gives the performance specifications for the A1SJ71AP21/R21.

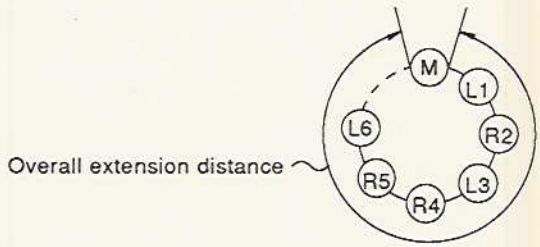
Table 2.2 Performance Specifications

Item			Optical Data Link	Coaxial Data Link
			A1SJ71AP21	A1SJ71AR21
Maximum link points in one station	Input (X)		Number of the points is differs depends on the I/O points of PC CPU model.	
	Output (Y)			
	MELSECNET mode		$\frac{B\text{ (points)} + Y\text{ (points)}}{8} + 2 \times W\text{ (points)} \leq 1024$ bytes	
	MELSECNET II (composite) mode		$\frac{B\text{ (points)} + Y\text{ (points)}}{8} + 2 \times W\text{ (points)} \leq 1024$ bytes (Link parameter first half) $\frac{B\text{ (points)}}{8} + 2 \times W\text{ (points)} \leq 1024$ bytes (Link parameter second half)	
Maximum link points in one system	MELSECNET mode	B	1024 points (128 bytes)	
		W	1024 points (2048 bytes)	
	MELSECNET II (composite) mode	B	4096 points (512 bytes)	
		W	4096 points (8192 bytes)	
Current consumption (5 VDC)			330 mA	630 mA
Weight kg (lb)			0.3 (0.66)	0.33 (0.73)
Allowable instantaneous power failure time			20 ms or less	
Communication speed			1.25 MBPS	
Communication method			Half duplex, bit serial method	
Synchronous method			Frame synchronous method	
Transmission path			Duplex loop	
Overall loop distance *1			Maximum 10 km (32810 ft) (1 km (3281 ft) between stations)	Maximum 10 km (32810 ft) (500 m (1640 ft) between stations)
Number of connected stations			Maximum of 65 stations (1 master station, 64 local stations)	
Modulation method			CMI method	
Transmission format			Conforms to HDLC (Frame format)	
Error control method			CRC (generating polynominal $X^{16} + X^{12} + X^5 + 1$) and retry after time-out	
RAS function			Loopback function on error detection or cable breakage, diagnostic functions such as link check.	
Connector			Two-core optical connector plug (CA9003)	BCN type connector plug
Cable			SI-200/250	3C-2V, 5C-2V or equivalent *2

Item	Optical Data Link	Coaxial Data Link
	A1SJ71AP21	A1SJ71AR21
Transmission loss	Maximum 12 dB/km	————
Sending level	-17 to -11 dB/km (peak value)	————
Receiving level	-32 to -11 dB/km (peak value)	————
Number of I/O occupied points	32 points	

REMARKS

*1: The overall loop distance refers to the distance from the master station sending port to the master station receiving port via slave stations.
For both the fiber optic cables and coaxial cables, the overall loop distance is a maximum of 10 km (32810 ft).



*2: For coaxial cables used in MELSECNET data link, the following cables are recommended;
RG-59B/U (MIL spec.), RG-6A/U (MIL spec.)

3. HANDLING

3.1 Handling Instructions

(1) Do not subject the case of the unit to impact.

(2) Do not touch the printed circuit board.

(3) Prevent the entry of wire offcuts into the units.

(4) Tighten screws as shown below.

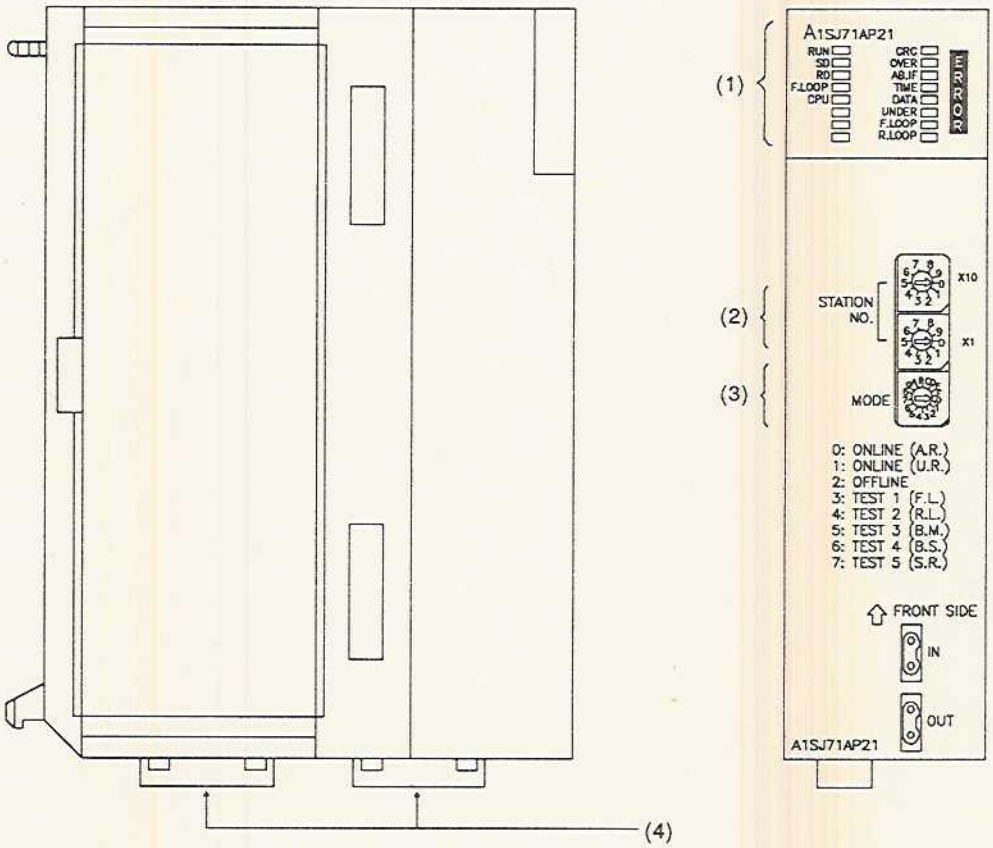
Screw	Tightening Torque Range N•cm (Kg•cm) [lb•inch]
I/O unit terminal block screw (M3 screw)	49 (5) [4.33] to 78.4 (8) [6.93]

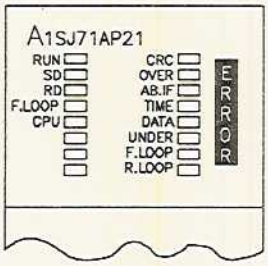
(5) Do not touch the fiber optic core or the tip of the connector. If these are touched, clean them with a soft cloth. Dirt will cause excessive transmission losses.

3.2 Part Identification

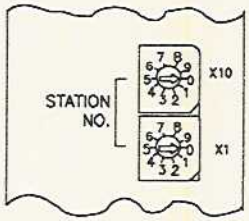
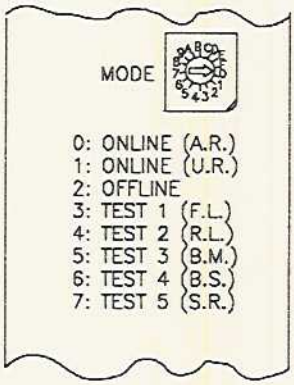
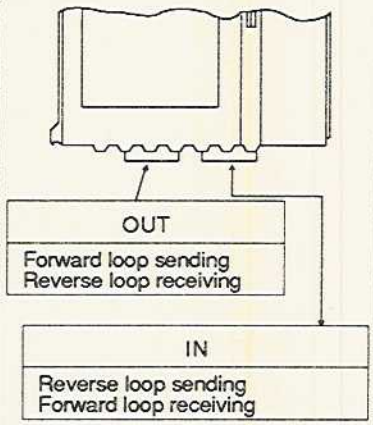
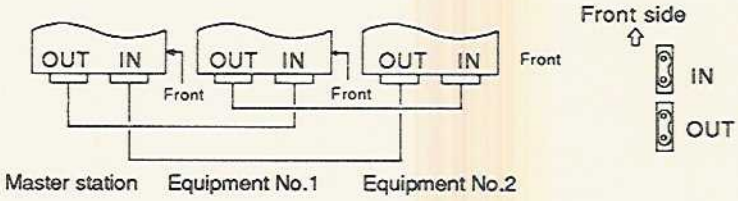
This section gives names and description of parts of the A1SJ71AP21/R21.

(1) A1SJ71AP21



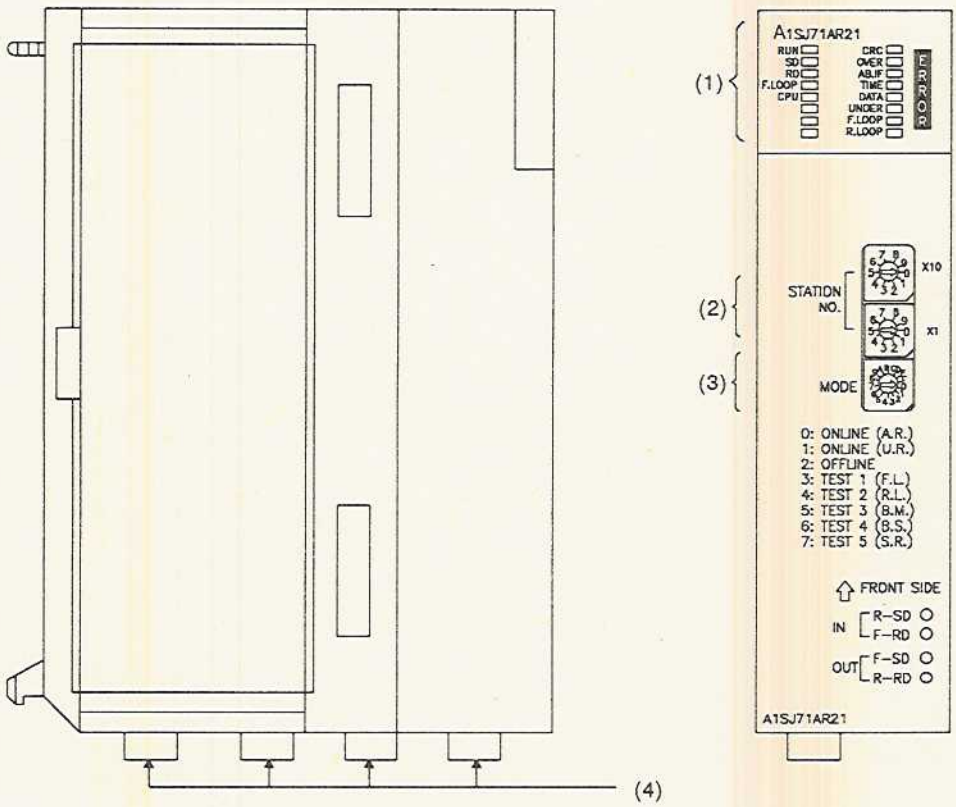
No.	Name and Appearance	Description
(1)	Operation and error indication LEDs 	

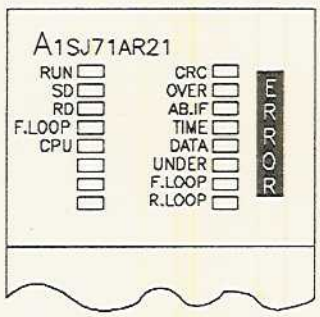
LED	Description
RUN	Lit when data link is normal.
SD	Lit during data sending.
RD	Lit during data receiving.
F.LOOP	Lit when data receiving line is a forward loop. OFF when reverse.
CPU	Lit during communication with PC CPU.
CRC	Lit at code check error time.
OVER	Lit at data entry delay error time.
AB.IF	Lit when all data are 1 or receiving data length is short.
TIME	Lit at time-out time.
DATA	Lit receiving data error time.
UNDER	Lit at sending data error time.
F.LOOP	Lit at forward loop receiving error time.
R.LOOP	Lit at reverse loop receiving error time.

<table>
<tr><th>No.</th><th>Name and Appearance</th><th>Description</th></tr>
<tr><td>(2)</td><td>Station number setting switches
 
</td><td>• Station number is set from 00 to 64.
Master station 00
Local station . . . . . .01 to 64
• The upper digit is set using the "X10" switch.
• The lower digit is set using the "X1" switch.
• The factory setting is "00".</td></tr>
<tr><td>(3)</td><td>Mode select switch
 
</td><td>By switching mode, the following function are available.
<table>
<tr><th>Setting Number</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Online</td><td>Automatic return set during normal operation.</td></tr>
<tr><td>1</td><td>Online</td><td>Automatic return not set during normal operation.</td></tr>
<tr><td>2</td><td>Offline</td><td>Disconnect host station.</td></tr>
<tr><td>3</td><td>Test mode 1</td><td>Forward loop test</td></tr>
<tr><td>4</td><td>Test mode 2</td><td>Reverse loop test</td></tr>
<tr><td>5</td><td>Test mode 3</td><td>Station-to-station test (master station)</td></tr>
<tr><td>6</td><td>Test mode 4</td><td>Station-to-station test (slave station)</td></tr>
<tr><td>7</td><td>Test mode 5</td><td>Self-loopback test</td></tr>
<tr><td>8 to F</td><td>—</td><td>Not usable</td></tr>
</table>
(The factory setting is "0".)</td></tr>
<tr><td>(4)</td><td>Connector
 
</td><td>• Optical fiber cable connector
• Connect the cable as shown below.
 

IN: Connect to OUT of preceding station
OUT: Connect to IN of next station</td></tr>
</table>

(2) A1SJ71AR21



No.	Name and Appearance	Description
(1)	Operation and error indication LEDs 	

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TIME	Lit at time-out time.
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F.LOOP	Lit at forward loop receiving error time.
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 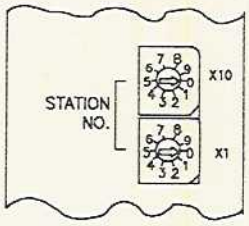
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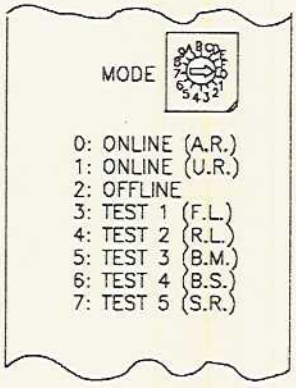
<tr><td>(3)</td><td>Mode select switch
 
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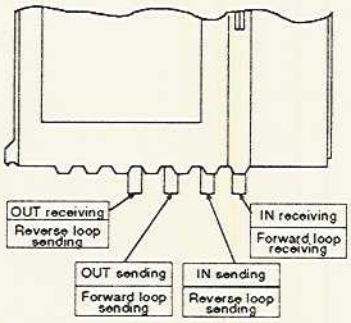
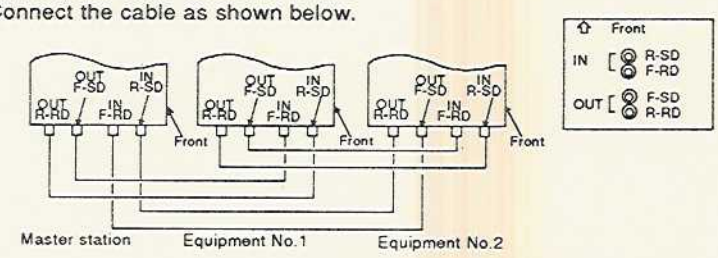
 
</td><td>• Coaxial cable connector
• Connect the cable as shown below.
 

IN-sending: Connect to OUT-receiving of preceding station
IN-receiving: Connect to OUT-sending of preceding station
OUT-sending: Connect to IN-receiving of succeeding station
OUT-receiving: Connect to IN-sending of succeeding station</td></tr>
</table>

3.3 Settings

(1) The following three items can be set for the A1SJ71AP21/R21 in the data link system.

(a) Station number setting with the station number setting switches

Set the station number at "00".

(b) Mode Setting with the Mode Select Switch

Select the appropriate operation and self-diagnosis test modes.

(c) Link parameter setting on the peripheral devices

Set link parameters on the CPU module (local station in the two-tier link system).

(2) For details of settings mentioned above in (1), refer to the MELCEC-NET, MELSECNET/B Data Link Reference Manual.

4. SELF-DIAGNOSIS

(1) In self-diagnosis, the A1SJ71AP21/R21 hardware, fiber optic cable and coaxial cable are checked for broken wires. Any of the following checks can be selected by changing the mode select switch position.

Switch Position	Mode Designation	Description
3	Forward loop test mode	In this mode, the fiber optic cable or coaxial cable line of the entire data link system is checked. The forward loop side on which normal linking is performed is checked.
4	Reverse loop test mode	In this mode, the fiber optic cable or coaxial cable line of the entire data link system is checked. The reverse loop side, on which loopback is performed in the event of an error, is checked.
5	Station-to-station test mode (master station)	In this mode, the line connecting the two stations is checked. Before checking, the station with the smaller statin number is designated as the main station; the other is the subordinate station.
6	Station-to-station test mode (slave station)	
7	Self-loopback test mode	In the self-loopback test, the hardware containing the transmission and receiving circuits is checked on an individual link unit basis.

(2) For tests other than the self-loopback test, see the MELSECNET, MELSECNET/B Data Link System Reference Manual.

4.1 Self-Loopback Test

(1) Self-loopback test

(a) The self-loopback test is intended to check the link module hardware containing the transmission and receiving circuits (forward and reverse loops) on an individual link module basis.

(b) A distinction between normal and faulty conditions is made depending on whether the data sent from the send end can be received within the specified duration at the receive end of the forward and reverse loops.

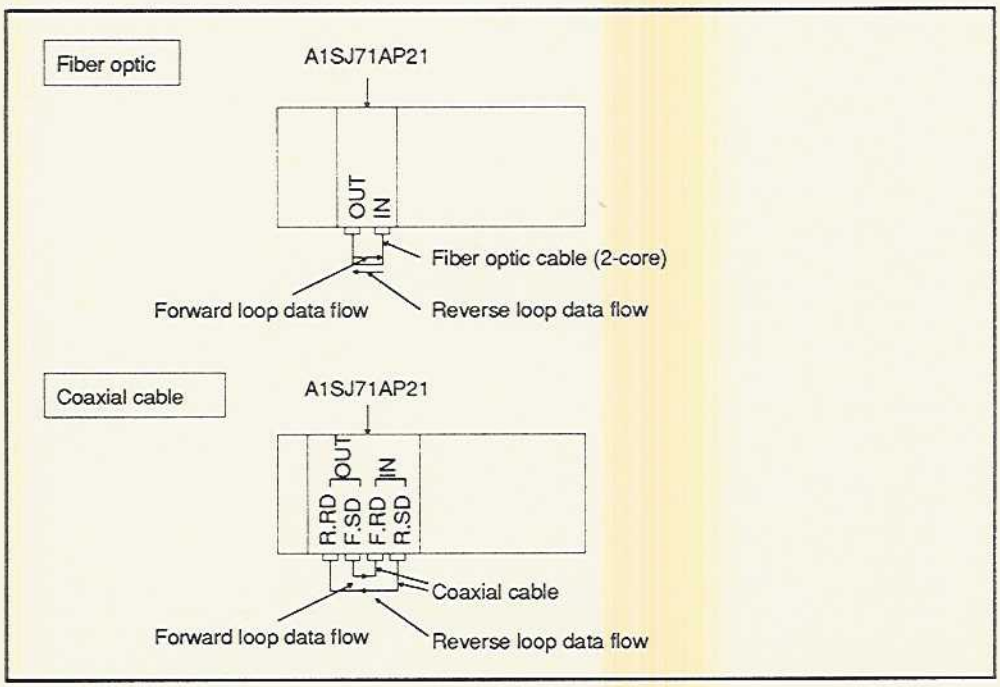
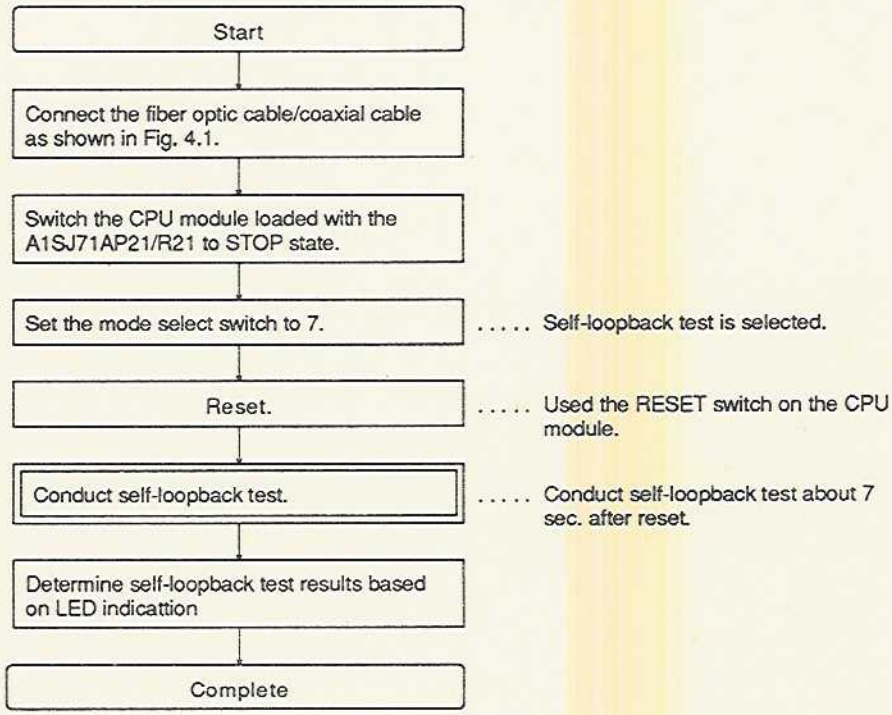


Fig 4.1 Self-Loopback Test

(2) Testing method

The self-loopback test procedure is given below.



(3) Judgment on test results

The test results are indicated by the LEDs on the A1SJ71AP21/R21 front panel.

(a) When the results are normal:

The CRC, OVER, AB.IF, TIME, DATA and UNDER LEDs successively turn on and off.

(b) When the results are abonormal:

The LED indicating the error in question lights and the test is discontinued.

1) When the F.LOOP, R.LOOP and TIME LEDs are lit:

i) The forward loop cable is broken.

ii) The forward loop send side and receive side are not connected.

iii) The forward loop send side is connected with the reverse loop send side and the reverse loop receive side is connected with the forward loop receive side.

2) When the F.LOOP, R.LOOP and DATA LEDs are lit:

i) The reverse loop cable is broken.

ii) The reverse loop send side and receive side are not connected.

3) When the ERROR LEDs other than those mentioned in items 1) and 2) are lit:

i) The hardware is faulty.

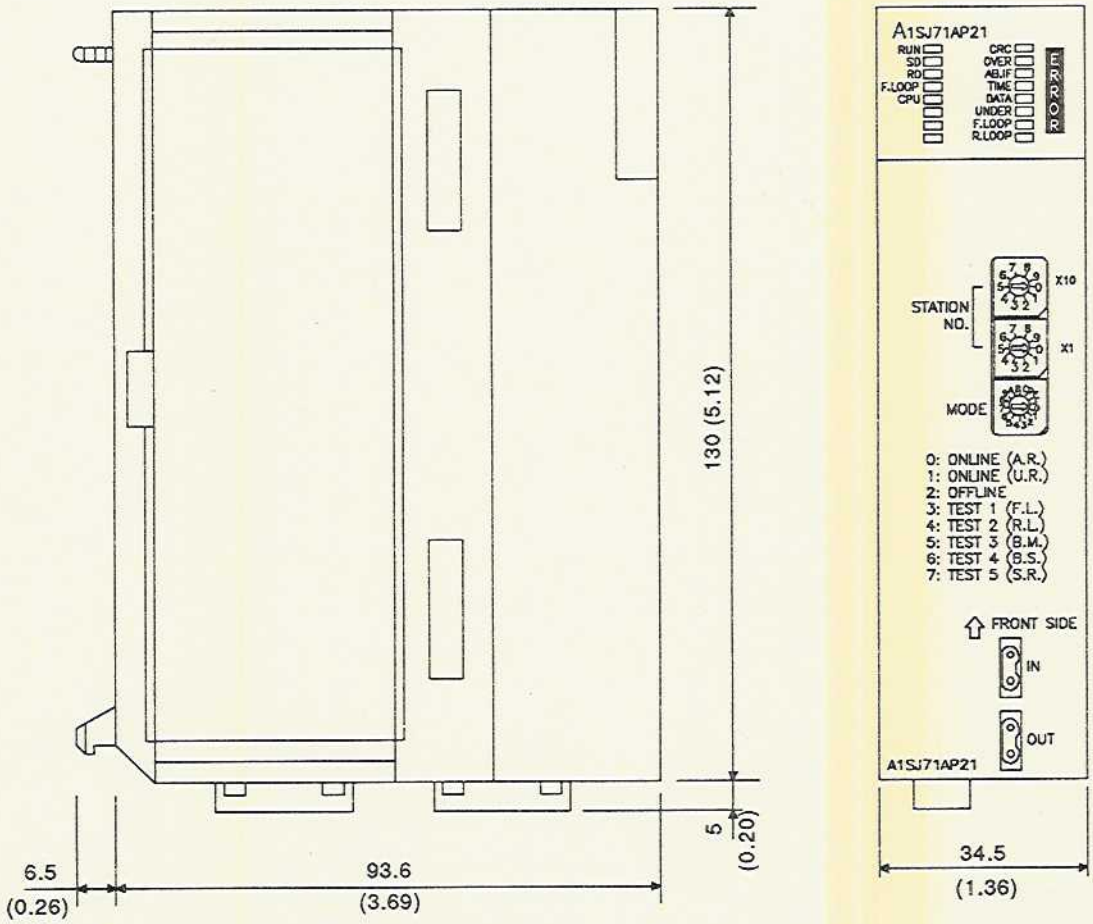
ii) The cable was disconnected during testing.

iii) The cable was broken during testing.

APPENDIX

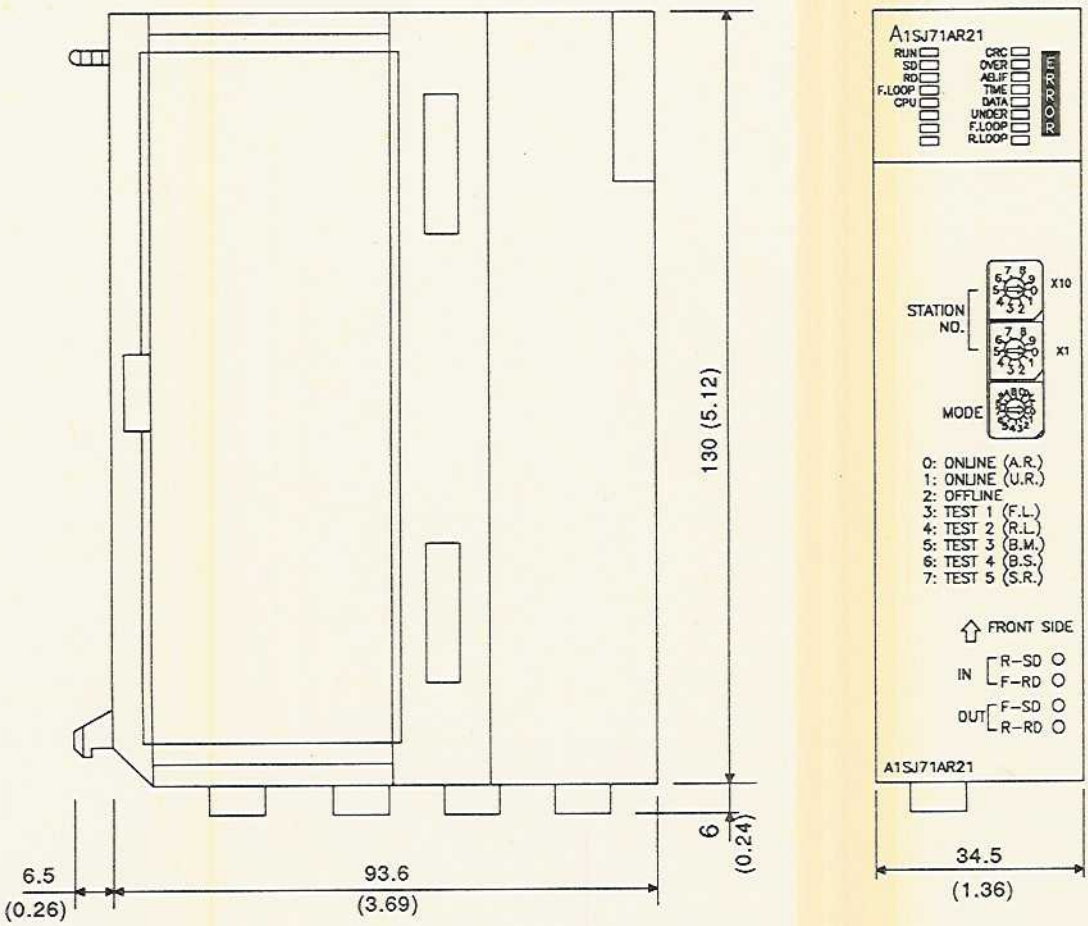
APPENDIX 1 DIMENSIONS

(1) A1SJ71AP21



Unit: mm (inch)

(2) A1SJ71AR21



Unit: mm (inch)

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 human body and work bench.

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