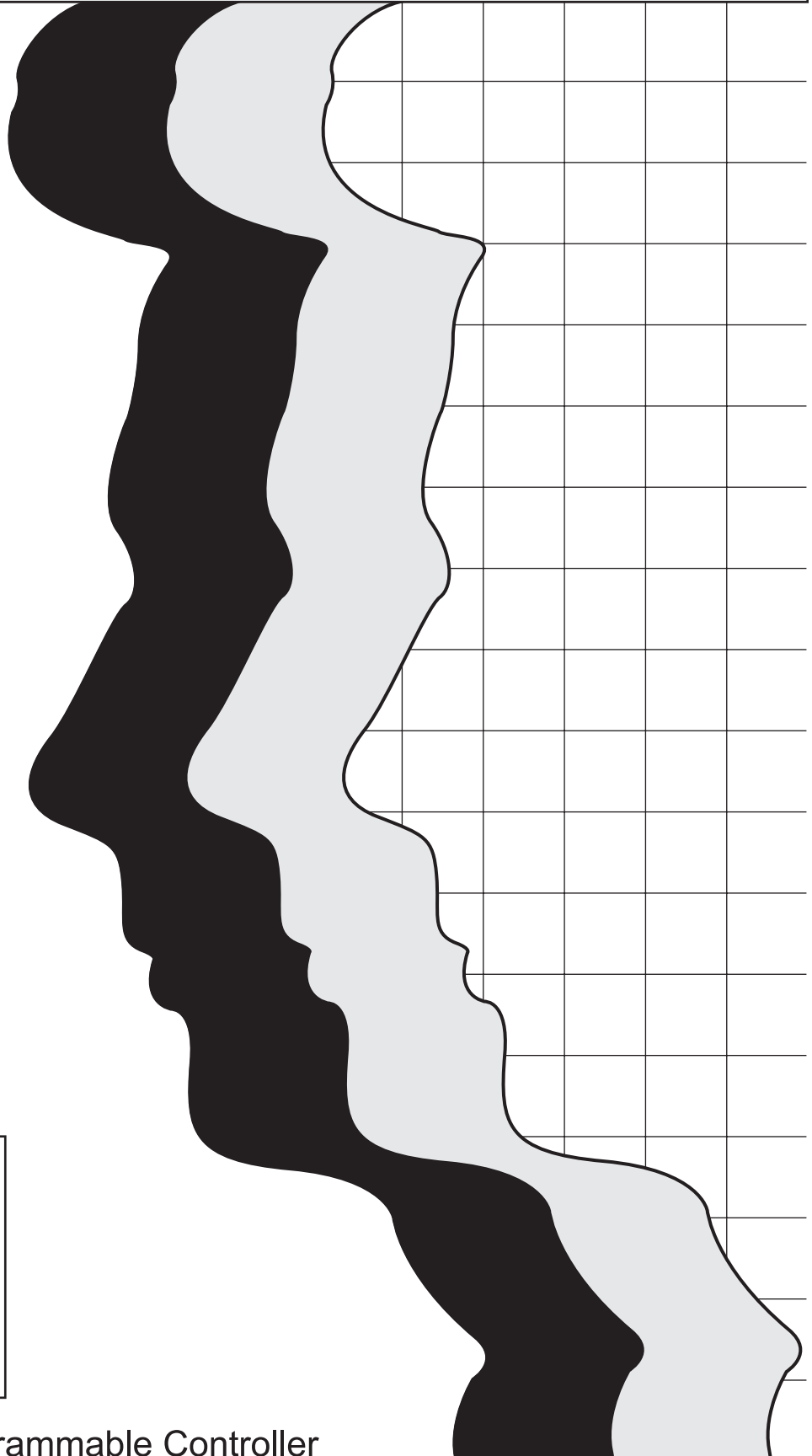


MITSUBISHI

Optic Bypass Switch Type A6BSW-P-S3(S4/S5/S6/S7)

User's Manual



Mitsubishi Programmable Controller



• SAFETY PRECAUTIONS •


(Always read before starting use.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the CPU module user's manual.


In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".


 DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
 CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the  CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please store this manual in a safe place and make it accessible when required. Always forward it to the end user.

[Design Precautions]

 DANGER
<ul style="list-style-type: none">• When a communication error occurs in a data link, the error station will be as described below. Using the communication status information, create an interlock circuit in a sequence program to ensure the system will operate safely. Failure to do so may cause an accident due to false output or malfunction.<ul style="list-style-type: none">(1) Data link data before the communication error are retained.(2) All outputs turn OFF at the remote I/O stations.For the communication error station checking method and the operation status at a communication error, refer to the corresponding data link manual.

 CAUTION
<ul style="list-style-type: none">• Do not bundle the control wires and communication cables with the main circuit or power wires, or install them close to each other. They should be installed at least 100 mm (3.94 in.) away from each other. Failure to do so may generate noise that may cause malfunctions.

[Installation Precautions]

CAUTION

- Use the module in an environment that meets the general specifications contained in this manual.
Using this module in an environment outside the range of the general specifications could result in electric shock, fire, erroneous operation, and damage to or deterioration of the product.
- Completely turn off the externally supplied power used in the system before mounting or removing the module. Failure to do so may damage the product.
- Do not directly touch the boards, conductive areas and electronic parts of the module. This may cause the module to malfunction or fail.

[Wiring Precautions]

DANGER

- Completely turn off the externally supplied power used in the system when installing or placing wiring. Failure to do so may cause electric shocks or damage the product.
- Before energizing and operating the system after installation and wiring, be sure to attach the terminal cover supplied with the product.
Not attaching the terminal cover could result in electric shock.

CAUTION

- Always earth the LG terminal to the protective earth conductor. Otherwise there will be an electric shock or erroneous operation.
- Perform correct wiring for the module according to the product's rated voltage and terminal arrangement. Connecting to a power supply different from rating or miss-wiring may cause fire and/or product failure.
- Tighten the terminal screws with the specified torque. If the terminal screws are loose, it could result in short circuits, fire, or erroneous operation.
- Be careful not to let foreign particles such as chaff and wire chips get inside the module. They may cause a fire, mechanical breakdown or malfunction.
- Make sure to place the communication and power cables to be connected to the module in a duct or fasten them using a clamp. If the cables are not placed in a duct or fastened with a clamp, their positions may become unstable and may move, or they may be pulled inadvertently. This may damage the module and the cables or cause the module to malfunction because of faulty cable connections.
- When disconnecting the communication and power cables from the module, do not pull the cables by hand. When disconnecting a cable with a connector, hold the connector to the module by hand and pull it out to remove the cable. When disconnecting a cable connected to a terminal block, loosen the screws on the terminal block first before removing the cable. If a cable is pulled while being connected to the module, it may cause the module to malfunction or damage the module and cables.

[Setup and Maintenance Precautions]

DANGER

- Do not touch the terminals while power is on.
Doing so could cause shock or erroneous operation.
- Correctly connect the battery.
Also, do not charge, disassemble, heat, place in fire, short circuit, or solder the battery. Mishandling of battery can cause overheating or cracks which could result in injury and fires.
- Before cleaning or retightening the terminal screws and/or module mounting screw, be sure to shut off all phases of the external power.
Failure to do so may cause the module to fail or malfunction.
If the screws are too loose, it can cause a drop of the module, short circuit or malfunction.
If too tight, it can cause a drop of the module, short circuit or malfunction due to damage to the screws or module.

CAUTION

- Never disassemble or modify the module. This may cause breakdowns, malfunctions, injuries or fire.
- Use a cellular phone or a PHS phone more than 25cm (9.85 inch) away in all directions of the PLC. Not doing so can cause a malfunction.
- Completely turn off the externally supplied power used in the system before mounting or removing the module. Failure to do so may damage the module or result in malfunctions.
- Do not touch the terminals while the power is on. Doing so may cause malfunctions.
- Before touching the module, be sure to touch grounded metal, etc. to discharge static electricity from human body, etc.
Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

CAUTION

- When disposing of this product, treat it as industrial waste.
When disposing of batteries, separate them from other wastes according to the local regulations.
(For details of the battery directive in EU member states, refer to APPENDIX 3.)
- A NiCad battery is used as a battery.
NiCad batteries are recyclable and valuable resources.
When disposing of used products, please recycle NiCad batteries.
- Do not dispose of NiCad batteries as they are.
Dispose of them as industrial wastes.

REVISIONS

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

Print Date	* Manual Number	Revision
Nov., 1993	IB (NA) -66447-A	First edition
	IB (NA) -66447-B	<p>New addition</p> <p>SAFETY PRECAUTIONS, WARARNTY</p> <p>Partial correction</p> <p>Chapter 1, Section 2.1, Section 2.2, Section 3.1, Section 3.2.1, Section 3.2.2, Section 3.2.3, Section 3.5.2, Section 3.6, Section 4.1, Section 4.3.3, Section 5.1, Section 5.3.1, Section 5.3.2, Section 7.2, Section 7.3, Section 7.4, Section 7.5, Section 8.3.1, APPENDIX 1, APPENDIX 2</p>
Aug., 2006	IB (NA) -66447-C	<p>Partial correction</p> <p>Section 3.4.1, Section 3.5.1, Section 3.5.2, Section 5.4.2</p>
Sep., 2008	IB (NA) -66447-D	<p>New addition</p> <p>APPENDIX 3</p> <p>Partial correction</p> <p>SAFETY PRECAUTIONS, Section 3.2.3, Section 5.1, Section 5.3.2</p>

Japanese Manual Version IB-68061-H

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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 user's manual gives the specifications, handling, etc. of the A6BSW-P-S3(S4/S5/S6/S7) optic bypass switch (hereinafter referred to as A6BSW) which is used with the MELSEC-A series optical data link module.

The A6BSW has the following features:

(1) Bypass service for the loop

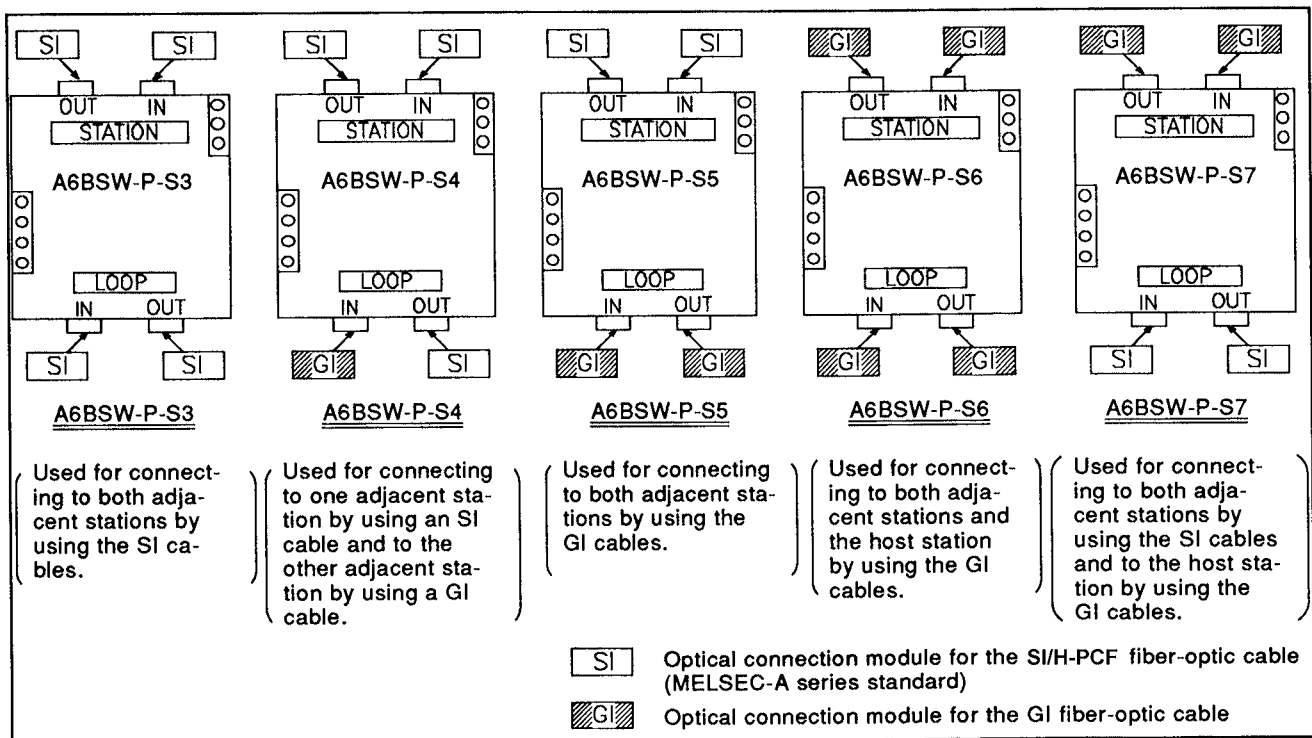
The A6BSW separates a station whose CPU is turned OFF from the data link system instead of executing loopback. Faulty (power failure) stations in a data link system are bypassed so that normal stations connected between such faulty stations can continue data communications.

(2) Extended distance between stations

By using the A6BSW as a relay station, it is possible to extend the distance between stations up to 2 km (1.24 mile) when the SI/H-PCF fiber-optic cables (hereinafter referred to as SI) are used, or up to 4 km (2.48 mile) when the GI fiber-optic cables (hereinafter referred to as GI) are used.

(3) Difference among A6BSW-P-S3, A6BSW-P-S4, A6BSW-P-S5, A6BSW-P-S6, and A6BSW-P-S7

The difference among A6BSW-P-S3, A6BSW-P-S4, A6BSW-P-S5, A6BSW-P-S6, and A6BSW-P-S7 is decided by the combination of optical connection modules used for connecting the fiber-optic cables as shown below. The functions, operations, and handling of them are all the same.



Refer to the following manuals if necessary for the operations with the A6BSW:

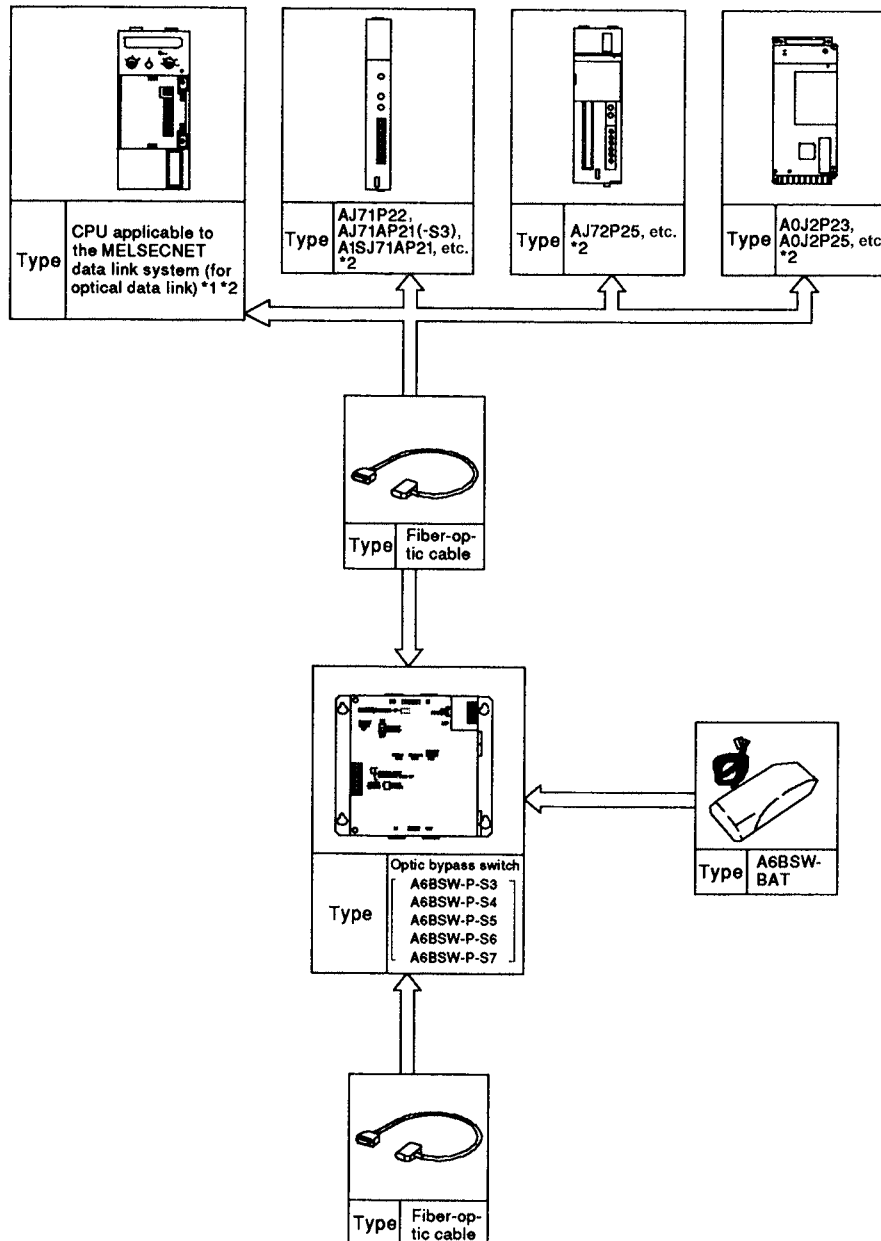
- type MELSECNET, MELSECNET/B Data Link System Reference Manual (IB(NA)-66350)
- User's Manual for CPU modules

2. SYSTEM CONFIGURATION

This section gives an optical data link system configuration with the MELSEC-A series PC and A6BSW-P-S3(S4/S5/S6/S7) optic bypass switch and the components and devices of the A6BSW-P-S3(S4/S5/S6/S7).

2.1 System Configuration

The optical data link system configuration using the A6BSW is as shown below.



*1: The A3VTS data link module is not applicable.

*2: For details, refer to the type MELSECNET, MELSECNET/B Data Link System Reference Manual (IB(NA)-66350).

2.2 Components and Devices

The components and devices of the A6BSW are as given below.

Component Name		Type	Description
Optic bypass switch		A6BSW-P-S3 (S4/S5/S6/S7)	Detects the turn OFF of the power to the link module of the station in which it is installed and separates the station from the data link. An external signal can also be used to control this switch to separate the station from the loop. The A6BSW-BAT battery is built in this switch.
Batt Battery		A6BSW-BAT	Used with the A6BSW-P optic bypass switch. A Ni-Cd battery with 7.2 V rating.
Fiber-optic cables	SI fiber-optic cable	*1	—
	H-PCF fiber-optic cable		—
	GI fiber-optic cable		—

POINT

When placing an order for the fiber-optic cables marked *1 above, refer to the fiber-optic cable specifications appended to this manual and contact your nearest Mitsubishi Electric System & Service Co., Ltd.

3. SPECIFICATIONS

This section gives the general specifications and performance specifications of the A6BSW and the specifications of the battery installed to the A6BSW.

3.1 General Specifications

General specifications of the A6BSW are as given below.

Item	Specifications				
Operating ambient temperature	0 to 55°C				
Storage ambient temperature	-10 to 70°C (for A6BSW only)*3 -30 to 45°C (for A6BSW-BAT battery only) -10 to 45°C (when A6BSW-BAT is included in A6BSW)				
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*1	Frequency	Acceleration	Amplitude	Sweep Count
		10 to 55 Hz	—	0.075 mm (0.003 in)	10 times (1 octave/minute)*2
		55 to 150 Hz	9.8 m/s ²	—	
Shock resistance	Conforms to JIS C 0912*1 (98 m/s ² , 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 1500 VAC for 1 minute across DC external terminals and ground				
Insulation resistance	5 MΩ or larger by 1500 VDC insulation resistance tester across AC external terminals and ground 5 MΩ or larger by 500 VDC insulation resistance tester across DC external terminals and ground				
Operating atmosphere	Free of corrosive gases. Dust should be minimal.				
Cooling method	Self-cooling				

REMARKS

*1: JIS : Japanese Industrial Standard

*2: 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, from 20 Hz to 40 Hz, from 40 Hz to 20 Hz, and 20 Hz to 10 Hz are referred to as one octave.

*3: "A6BSW only" is referred to when the A6BSW-BAT battery is removed.

3.2 Performance Specifications

Performance specifications such as power supply and transmission and built-in battery specifications of the A6BSW are as given below.

3.2.1 Performance specifications

Item		Specifications	
Rated power supply voltage	Rating	100/120 VAC, 200/240 VAC, 50/60 Hz	
	Operating voltage range	85 to 264 VAC, 47 to 63 Hz	
	Allowable momentary power failure period	20 ms TYP. (100 VAC, 25 °C)	
Rated current consumption		0.2 A (100 VAC 25 °C)	
Backup battery	Built-in battery	Type	A6BSW-BAT Ni-Cd cell
		Nominal voltage	7.2 V
		Backup time	6 hours when 100% charged (100% charged after 40 hours of charging)
		Charging method	Charged when the 100/200 VAC power is supplied.
	External power supply	Rated voltage	12 VDC
		Operating voltage range	10.2 to 13.2 VDC
		Current consumption	0.6 A
Bypass switching method		Automatic switching by detecting the PC power OFF, or forced switching by the slide switch or external signal (12/24 VDC).	
*2 External input remote bypass	Rated input voltage	12 VDC, 24 VDC	
	Rated input current	4 mA, 10 mA	
	Operating voltage range	10.2 to 26.4 VDC (with 5% or less ripple)	
	ON voltage/ON current	9 V or over/3 mA or over	
	OFF voltage/OFF current	6 V or less/1.5 mA or less	
	Input resistance	Approx. 2.4 kΩ	
Max. number of switch units usable per loop		Number of slave stations in a loop + 2 units	
External connection method		Terminal block connector (M3.5 x 8 screw)	
Applicable cable size		0.75 to 2 mm ² (Tightening torque: 69 to 98 N·cm)	
Applicable solderless terminal		1.25-4, 1.25-YS 4 A, 2-S4, 2-YS 4A V1.25-4, V1.25-YS 4 A, V2-S4, V2-YS 4 A	
Outside dimensions		250 (9.84 in.)(H) x 240 (9.45 in.)(W) x 91 (3.58 in.)(D) [mm]	
Weight		4 kg (with built-in battery)	

POINTS

- *1: The 12 VDC power supply (set with a setting pin, see Section 4.3.1) is not needed when a built-in backup battery is used. However, it is possible to use the built-in battery together with the 12 VDC power supply. When the two are used together, the 12 VDC power supply is used to back up the bypass function. When the 12 VDC power supply becomes lower than the required level, the built-in battery automatically takes over the backup function.
- *2: The remote bypass function is enabled by switch pin setting for the backup function/remote bypass function (see Section 4.3.1 for details).

3. SPECIFICATIONS

3.2.2 Transmission specifications

The transmission specifications of the A6BSW are as given in the table below.

Item	Specifications	
	When SI/H-PCF fiber-optic cable is used	When GI fiber-optic cable is used
Transmission speed	1.25 MBPS	
Transmission method	Half-duplex bit serial method	
Synchronizing method	Frame synchronizing method	
Transmission path type	Duplex loop	
Overall extension of loop	Max. 10 km (between stations: 1 km)	Max. 10 km (between stations: 2 km)
Modulation method	CMI method	
Connector	Refer to Appendix 1.	
Cable		
Transmission loss		
Sending level	-17 to -11 dBm (peak)	*-17 to -10 dBm (peak)
Receiving level	-32 to -11 dBm (peak)	*-29 to -10 dBm (peak)

POINTS

- (1) The maximum extension of a loop which includes the A6BSW is 10 km which is the same as that of a loop which does not include the A6BSW (see Section 5.3.1 for details).
- (2) When hardware version of the A6BSW-P-S4/S5 is A, B, C, or D, the sending and receiving levels indicated by the * symbol above are as mentioned below.
 Sending level: -24 to -20 dBm (peak)
 Receiving level: -34 to -20 dBm (peak)

3.2.3 Battery specifications

The specifications of the battery used with the A6BSW are as given below.

Item	Specifications
Type	A6BSW-BAT
Name	Sealed Ni-Cd cell
Nominal voltage	7.2 V
Backup time	6 hours (from 100% charged condition)
Charging time	40 hours (from 100% discharged condition)
Service life	500 times of charging from 100% discharged condition Operating life: 5 years
Storage ambient temperature	-30 to 45 °C
Outside dimensions	186 (7.32 in.)(H) x 70 (2.76 in.)(W) x 35 (1.38 in.)(D) [mm]
Weight	0.95 kg (2.09 lb)

POINT

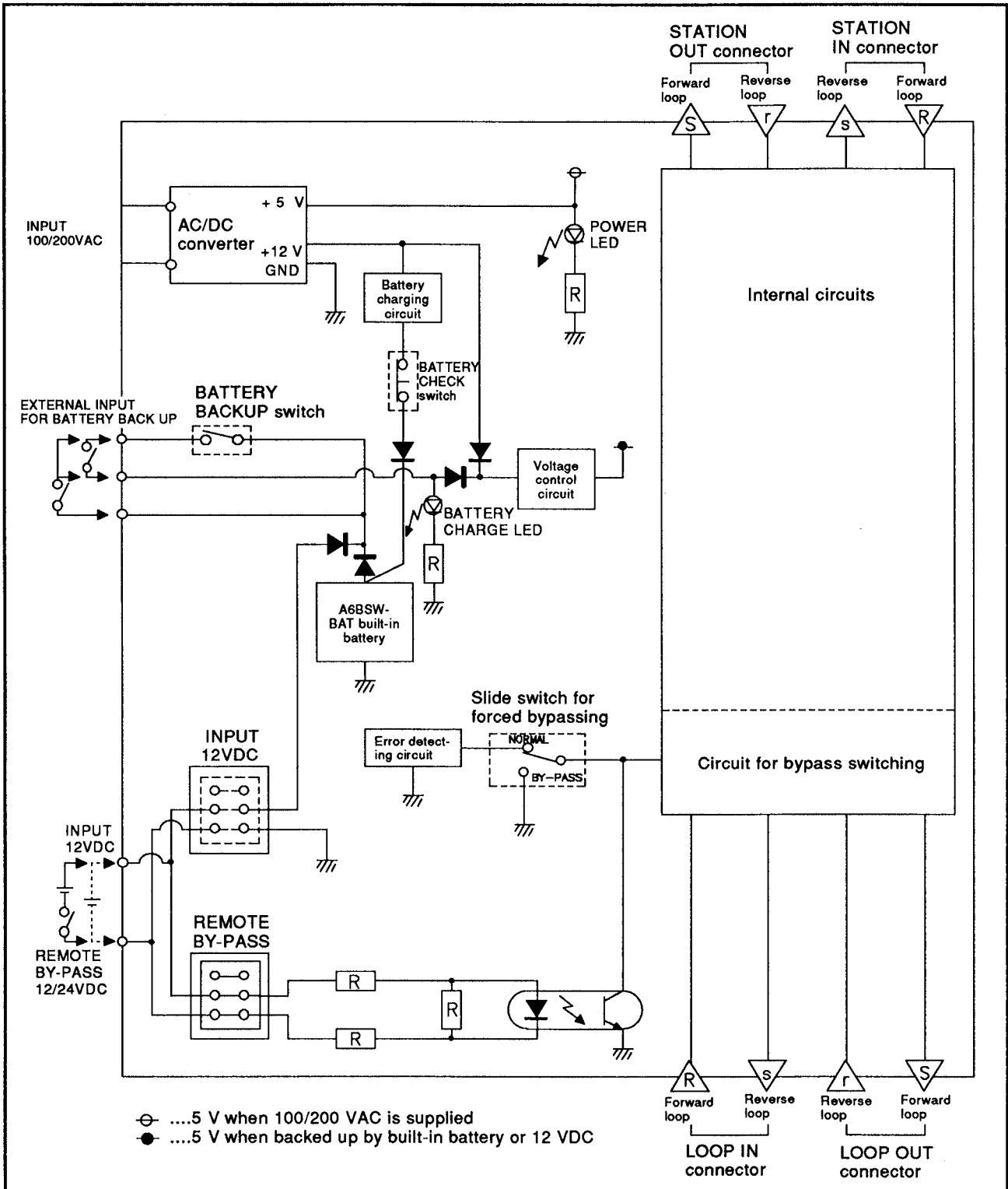
The operating life *1 is the value when the A6BSW is used at 40°C or lower operating temperature. This becomes 3 years when the A6BSW is used in 41°C to 55°C temperature range.

REMARKS

For the battery directive in EU member states, refer to APPENDIX 3.

3.3 Function Block Diagram

The diagram below shows the function blocks of the A6BSW.



3.4 Functions

An optical data link system built with the A-series PCs with the A6BSW has the following functions.

3.4.1 Bypass function

- (1) A data link system built with the A-series PCs has a loopback function using a duplex loop system. When two or more stations in the loop are down due to power failure, however, all stations connected between the faulty stations are set offline.

The A6BSW detects a power failure of the PC and the cable disconnections between the A6BSW and the PC, and sets only faulty stations offline without switching the loop.

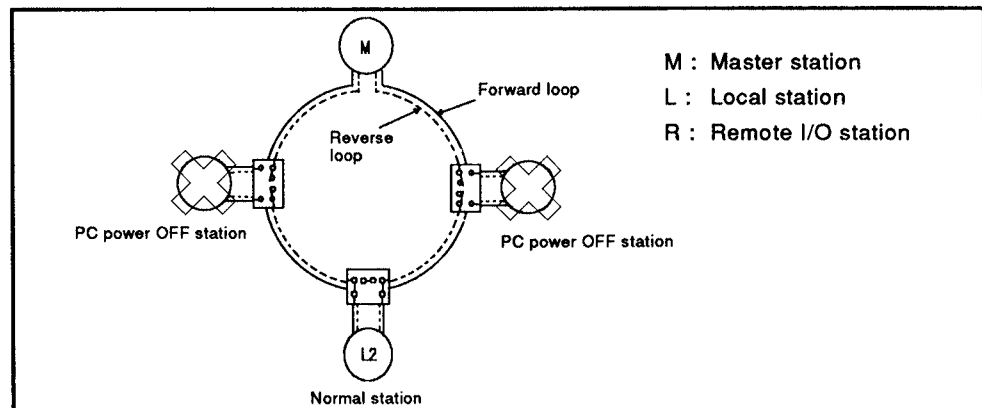
Therefore, normal stations between faulty stations are not set offline.

- (2) The bypass function of the A6BSW is enabled according to the ON/OFF state of the 100/200 VAC power supply as mentioned below.

When 100/200 VAC is ON: The bypass function is enabled by the 100/200 VAC power supply.

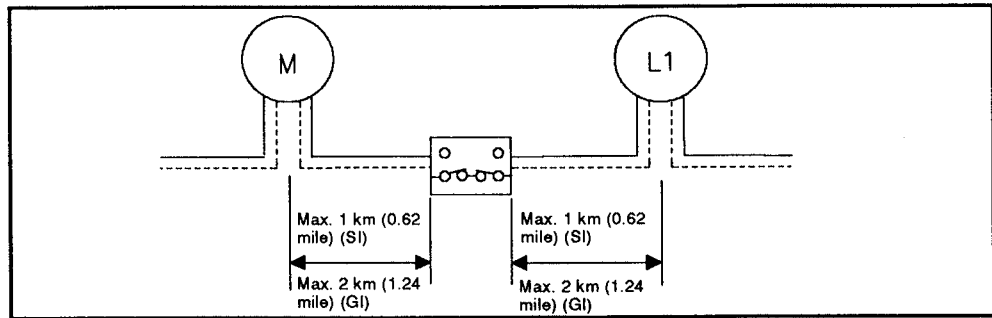
When 100/200 VAC is OFF: The bypass function is enabled by the backup power supplies of the built-in battery or the 12 VDC power supply.

The bypass function when the 100/200 VAC power supply is OFF can be set or canceled by the battery backup switch (see Section 4.3.3 for details).



3.4.2 When used as a relay station

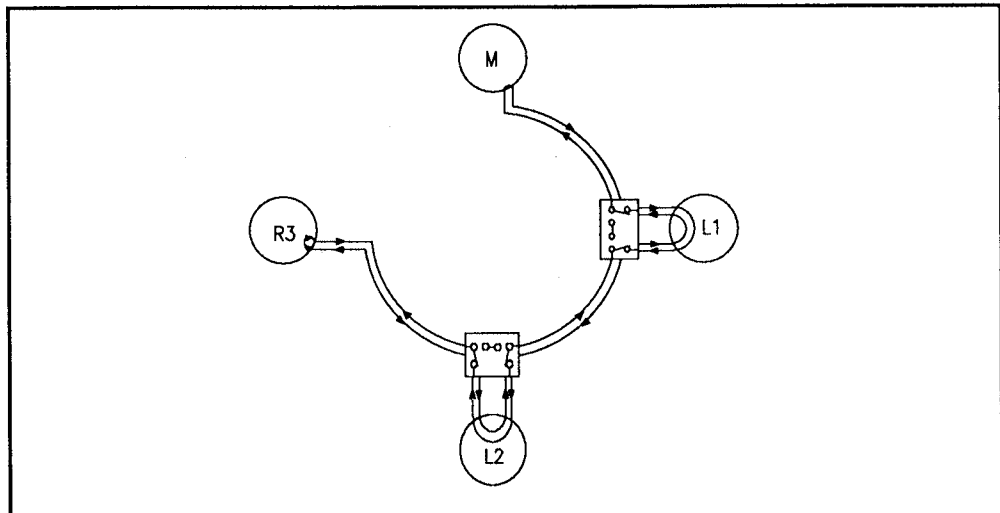
- (1) By connecting an A6BSW as a relay station between two stations, the station-to-station distance can be extended up to 2 km (1.24 mile) with the SI cables and up to 4 km (2.48 mile) with the GI cables. The maximum overall extension of the data link system is 10 km (6.21 mile).
- (2) Only one A6BSW can be connected as a relay station between stations.
- (3) Setting for the relay station is made with the forced bypassing switch (see Section 4.3.4) of the A6BSW.



3.4.3 An application example of fiber-optic cable connection

Since the A6BSW works to bypass faulty (power failure) stations, it is possible to build a data link system in which the master station is not directly connected to the last station so that the last station always executes loopback. This data link system can be built by installing the A6BSW to all local and remote I/O stations except the last station.

If this kind of data link system is built without using the A6BSW, a faulty station and all stations connected after the faulty station are set offline.



POINT

When an abnormality other than power failure (such as cable breakage and link module fault) occurs, the faulty station or all stations connected after the faulty part are disabled to maintain a data link.

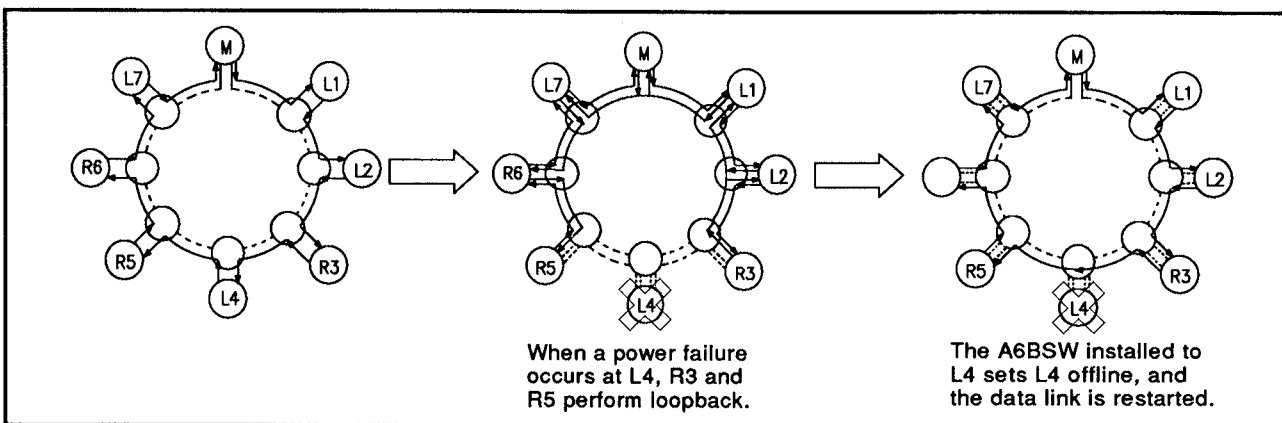
Example: When the fiber-optic cable between stations L1 and L2 breaks, L1 performs loopback and L2 and R3 are set offline.

3.5 Precautions for the Bypass Operation

The bypass operation processing of the A6BSW and precautions for operating the data link system are explained below.

3.5.1 Bypass switching timing

When the A6BSW detects a power failure of the PC and turns its bypass switch to the bypass operation side, the loopback operation is performed once depending on the switching timing and the link scan timing. The faulty station is set offline by the bypass function immediately after the loopback, and the data link is continued by the forward loop (see the figure below).

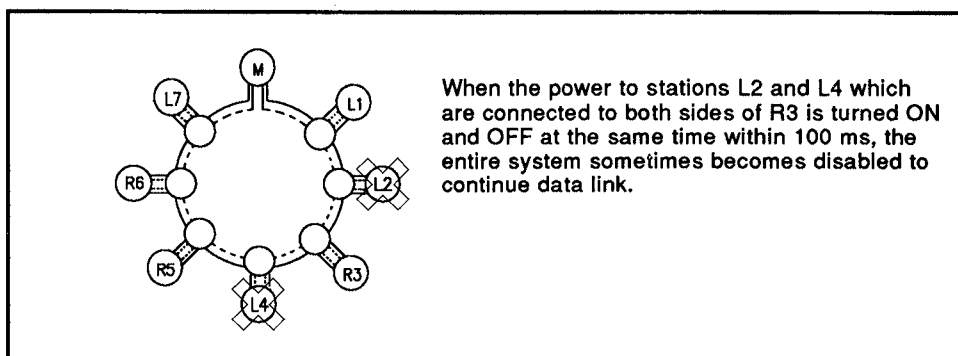


3.5.2 Causes of disability of data link

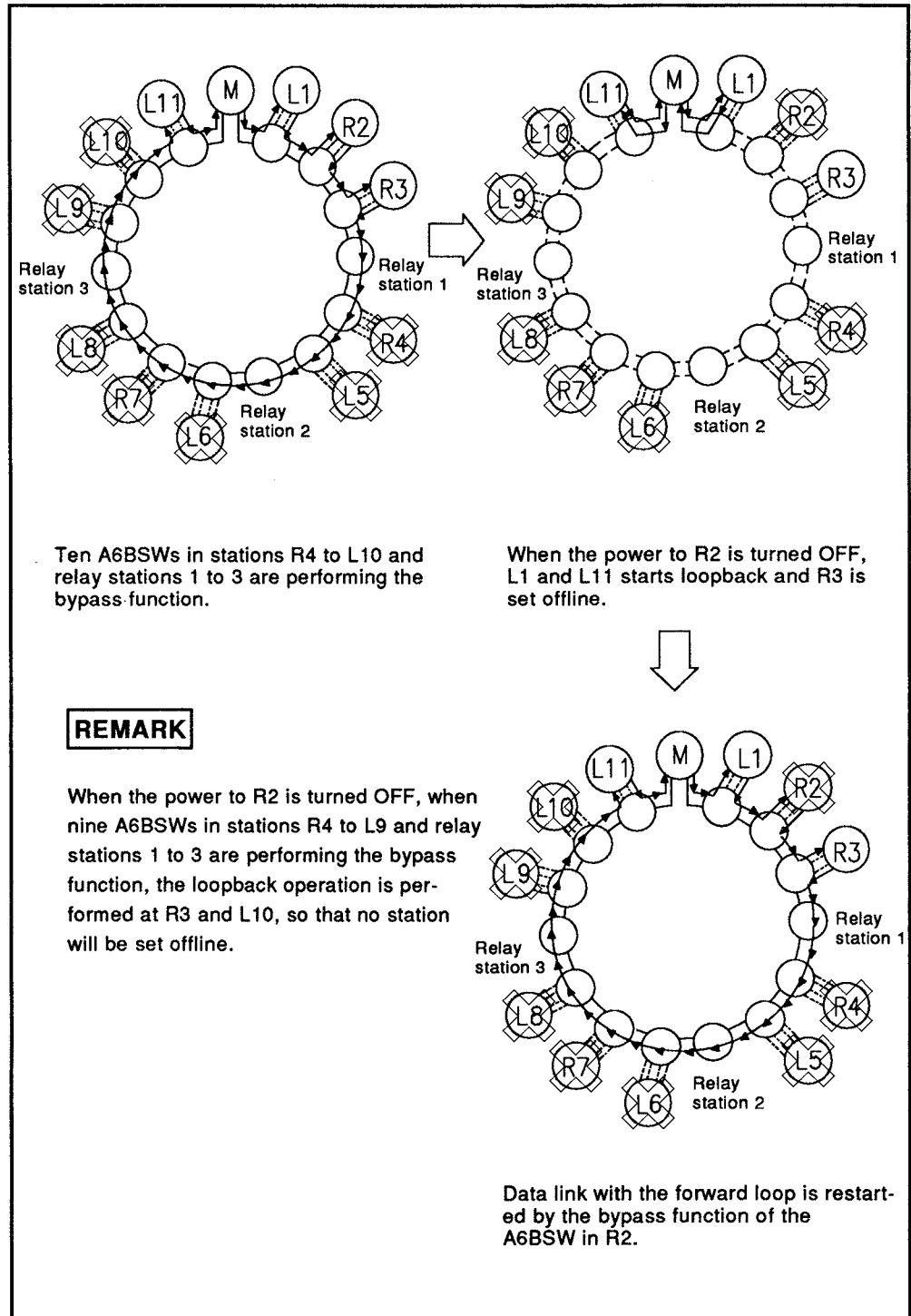
Disability of data link with the entire system or specific stations when the A6BSWs are used is explained below.

- (1) When two stations which are connected to both sides of a local or remote I/O station cause a power failure or reset at the same time (within 100 ms), the entire system sometimes becomes disabled to make a data link.

Stations whose link module has been set for "automatic online return" with the mode select switch will soon restart communications. However, stations set for "no automatic online return" remain offline. To return such offline stations to online, reset those stations.



- (2) When 10 or more consecutive A6BSWs which are used for the bypass function or relay stations are executing the bypass function, and when the PC in a normal station causes power failure, the loopback operation is performed for an instant, often setting some other stations offline. Immediately after the loopback operation, only the faulty station is set offline and the data link by the forward loop is restarted by the bypass function of the A6BSW.



3.6 Delay of Data Transmissions

Delay of data transmissions in a data link system which uses the A6BSW is explained below.

When the A6BSW is used, the data transmission time becomes longer by the time (β) mentioned below than that when the A6BSW is not used (link scan time).

$$\beta = 9.6 \times \left[\begin{array}{l} \text{Number of A6BSWs used} \\ \text{for the bypass function} \end{array} \right] \times \left[\begin{array}{l} \text{Total number of} \\ \text{slave stations} + 6 \end{array} \right] \\ + 4.8 \times \left[\begin{array}{l} \text{Number of A6BSWs used} \\ \text{as the relay stations} \end{array} \right] \times \left[\begin{array}{l} \text{Total number of} \\ \text{slave stations} + 6 \end{array} \right] \quad [\mu\text{s}]$$

Therefore, the link scan time of the system which uses the A6BSW (LS') is as follows;

$$LS' = LS + \frac{\beta}{1000} \quad [\text{ms}] \quad \left[\begin{array}{l} LS': \text{Link scan time when the A6BSW is used} \\ LS: \text{Link scan time when the A6BSW is not used} \end{array} \right]$$

The link scan time when the loopback operation is performed is as follows;

$$LS' = LS + \frac{2\beta}{1000} \quad [\text{ms}]$$

REMARK

For the link scan time when the A6BSW is not used (LS), refer to the following manual.

- type MELSECNET, MELSECNET/B Data Link System Reference Manual (IB(NA)-66350)

4. HANDLING

The names and descriptions of parts and handling (especially preparations for installation) of the A6BSW are explained below.

4.1 Handling Instructions

- (1) Do not drop nor give mechanical shock to the A6BSW. The case may become distorted and the boards inside the A6BSW may break.
- (2) Ensure that no conductive debris such as wire offcuts and drill cut chips can enter the A6BSW. If debris does enter, make sure that it is removed.
- (3) Do not remove the printed circuit boards from the case. There are no user-serviceable parts on the boards.
- (4) Do not touch the fiber-optic cores in the connector or cable and keep them clean. If such parts are contaminated, transmission loss becomes large and communications may often be disabled. If contaminated with finger oil or dust, wipe it off with a soft cloth.
- (5) Tighten the terminal screws as specified below:

Screw	Tightening Torque Range
Screws for terminals for connecting power supply 100/200 VAC (3P) (M3 screw)	49 to 78 N·cm
Screws for the battery backup switch and for terminals for connecting 12 VDC power supply (5P) (M3.5 screw)	69 to 98 N·cm

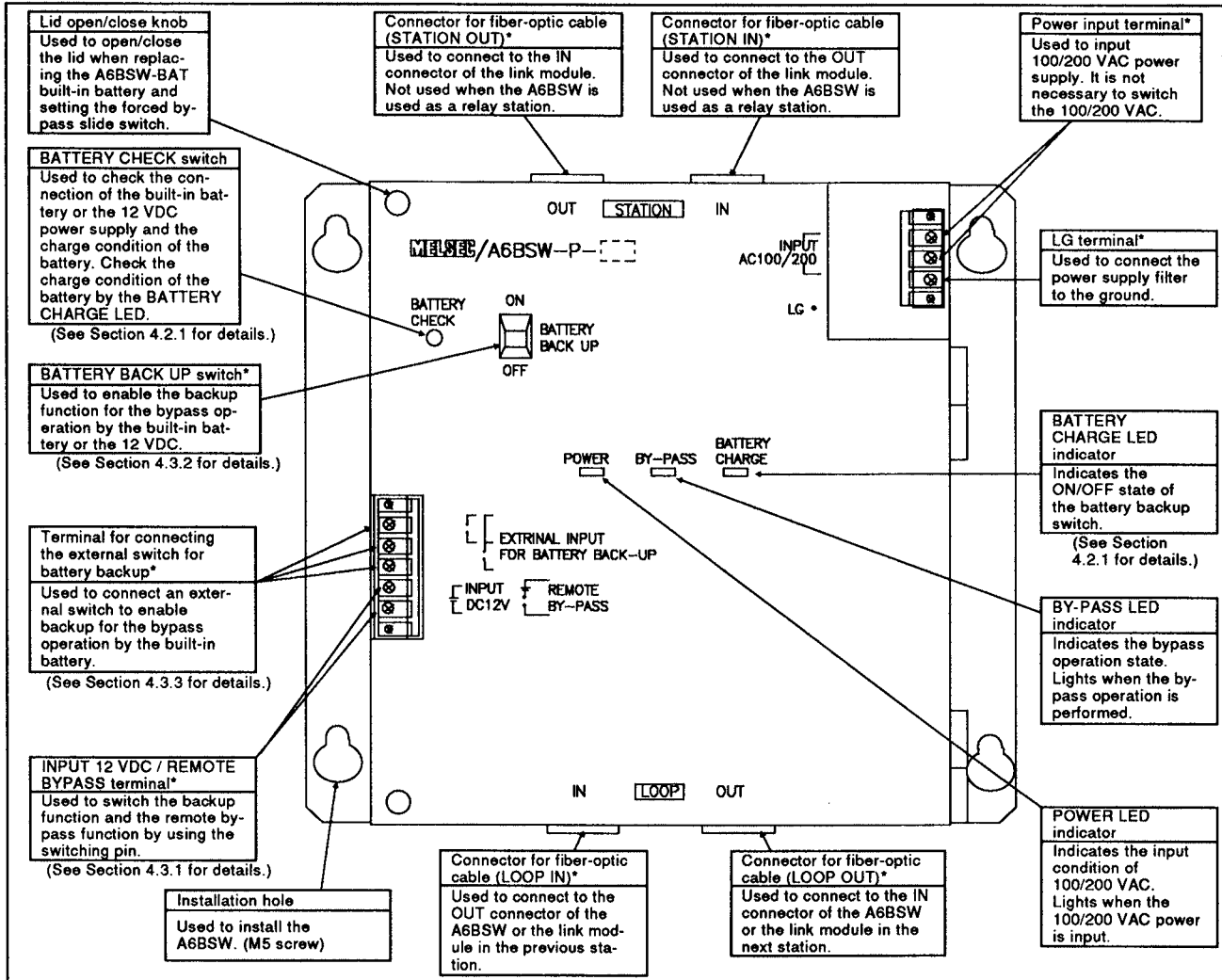
- (6) Do not treat the A6BSW-BAT battery as mentioned below:
 - (a) Short-circuiting across the poles
 - (b) Disassembling
 - (c) Throwing into the flame
 - (d) Heating
 - (e) Soldering to the poles

POINTS

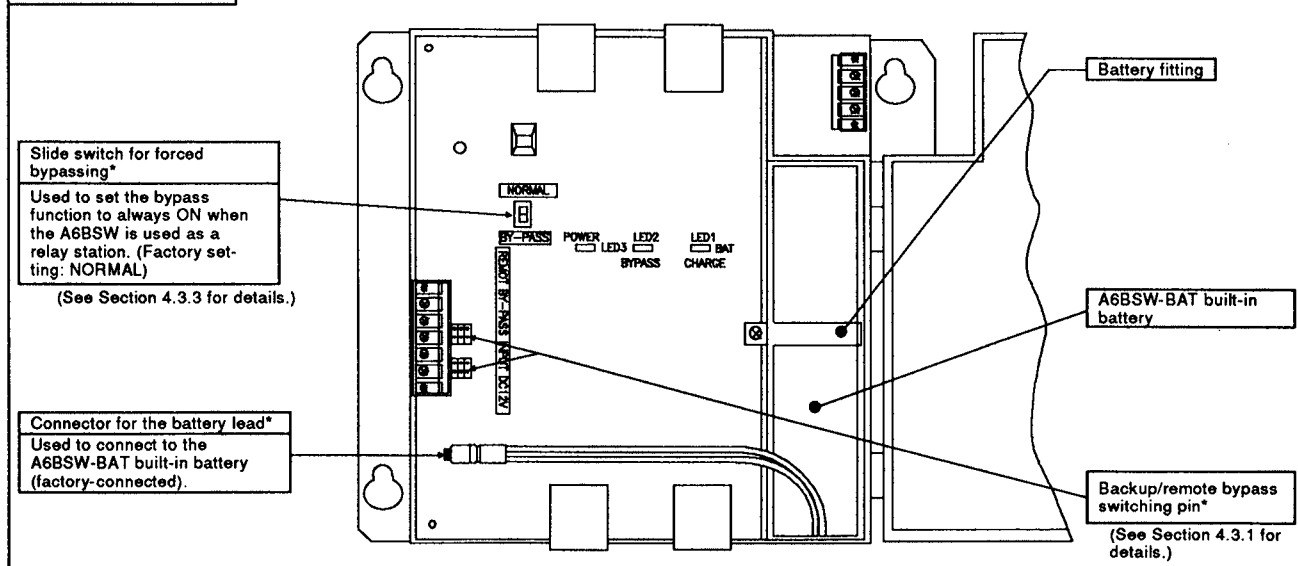
- (1) When the built-in battery is used for the bypass operation, the built-in battery should be charged 100%.
It takes 40 hours or more to charge a 100% discharged built-in battery to 100% by using the 100/200 VAC input power supply of the A6BSW. When a built-in battery which is not 100% charged is used for bypassing, it is impossible to maintain the bypass operation more than 6 hours.
- (2) When it is not necessary to back up the system when the A6BSW power (100/200 VAC) is left turned OFF for an extensive period, turn OFF the battery backup switch.
When the 100/200 VAC is turned OFF when the battery backup switch is ON, the bypass operation is performed by the built-in battery or the 12 VDC.

4.2 Names and Descriptions of Parts

The names and descriptions of parts are given below.



When the lid is open



Parts described in * need to be set or connected before a test run or adjustments.

4.2.1 Battery charge LED

The BATTERY CHARGE LED indicator on the front of the A6BSW has the following functions:

- (1) This LED is used to monitor the ON/OFF state of the battery backup switch (see Section 4.3.3 for details). It lights when the battery backup switch is ON.
When both the 100/200 VAC power supply and the backup power supply (built-in battery or 12 VDC) are OFF, or when the 100/200 VAC power supply is ON, the backup power supply is OFF, and the battery check switch is ON, the LED does not light since it is not supplied with sufficient power.

Battery Backup Switch	Battery Check Switch	100/200 VAC Power Supply	Built-in Battery or 12 VDC	LED State
ON	ON/OFF	ON	ON	Lit
		OFF		
	OFF	ON	OFF	Not lit
	ON/OFF	OFF	OFF	
	ON	ON	OFF	

- (2) The backup power supply connection or capacity can be checked by the battery charge LED condition when the battery check switch is ON. Note that this is effective when the 100/200 VAC power supply is ON and the battery backup switch is ON.

Condition of the Battery Charge LED When the Battery Check Switch is ON	Description
Lit	Backup by the built-in battery or 12 VDC power supply is possible.
Not lit	The built-in battery or 12 VDC power supply is not connected or capacity is insufficient.

POINT

Checking of the backup power supply with the battery check switch can judge the connection and backup capability. However, it is impossible to detect the capacity of the backup power supply. Therefore, it is not certain how long the backup function lasts even when the battery charge LED is lit. When the bypass function may be backed up or to perform backup by setting the function, it is recommended to use a built-in battery which has been charged for 40 hours or more or a new 12 VDC power supply.

4.3 Setting Switches

The setting switches which are necessary for operating the A6BSW and the BATTERY CHARGE LED are explained below.

4.3.1 Backup/remote bypass switching setting pin

The setting procedure for the setting pin used for switching between the backup function by external power supply (12 VDC) and the remote bypass function is explained below.

The backup / remote bypass switching setting pin is used to switch the external wiring connection terminal (INPUT 12 VDC / REMOTE BY-PASS terminal) for the following purposes.

- Backup for the bypass function by the 12 VDC external power supply
- Remote bypass function by using external input signal

IMPORTANT

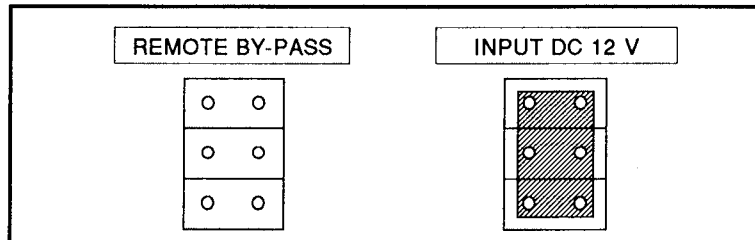
When switching each function, check the setting pin.
The voltages used with each function are as follows:

- Backup by external power supply 12 VDC
- Remote bypass by external input signal .. 12/24 VDC

Use caution not to input 24 VDC when INPUT 12 VDC is set.

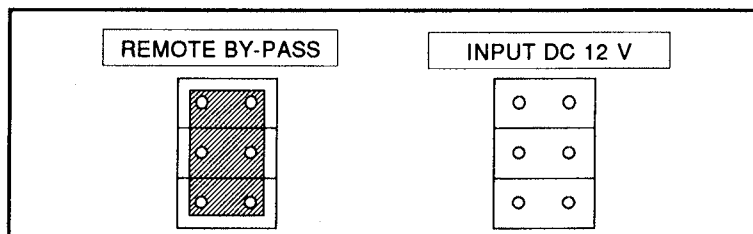
- (1) To enable backup for the bypass function by 12 VDC external power supply

Insert a short pin in the "INPUT DC 12V" side as shown below.



- (2) To enable the remote bypass function by external input signal

Insert a short pin in the "REMOTE BY-PASS" side as shown below.



REMARK

The short pin is inserted in the "REMOTE BY-PASS" side when shipped from the factory.

4.3.2 Battery backup switch

The settings and functions of the battery backup switch and external backup switch are explained below.

- (1) The battery backup switch is used to allow power supply from the built-in battery or 12 VDC external power supply to back up the bypass function when the 100/200 VAC power of the A6BSW is turned OFF. When supplying power from the 12 VDC external power supply, connect the 12 VDC power supply to the INPUT DC 12V / REMOTE BY-PASS terminal (see Section 5.2).
- (2) Switch settings for the backup vary as mentioned below according to the wiring method to the EXTERNAL INPUT FOR BATTERY BACKUP terminal for an external battery backup switch.

	Wiring	Conditions That Enable Backup of the Bypass Function
1		<ul style="list-style-type: none"> • Battery backup switch on the front side of A6BSW • External battery backup switch <p style="text-align: right;">} Either one is ON.</p>
2		<ul style="list-style-type: none"> • Battery backup switch on the front side of A6BSW • External battery backup switch <p style="text-align: right;">} Both are ON.</p>
3		<p>External battery backup switch is ON. (Battery backup switch on the front side of A6BSW is ignored.)</p>
4		<p>Battery backup switch on the front side of A6BSW is ON.</p>
5		<p>Always enabled (Battery backup switch on the front side of A6BSW is ignored.)</p>

- (3) The built-in battery is charged when the 100/200 VAC power supply to the A6BSW is ON regardless of the ON/OFF state of the battery backup switch.
- (4) When the battery backup switch is ON and a backup by the built-in battery or external 12 VDC power supply is possible, the BATTERY CHARGE LED on the front of the A6BSW lights regardless of the ON/OFF state of the 100/200 VAC power supply to the A6BSW. However, when the built-in battery or external 12 VDC power supply is not connected or when the built-in battery or the 12 VDC power supply does not have enough capacity for performing backup, the BATTERY CHARGE LED does not light when the battery backup switch is turned ON.
- (5) The bypass function execution according to the ON/OFF state of the 100/200 VAC power supply and the battery backup switch is as given below.

100/200 VAC Power Supply		Battery Charge Condition	Battery Backup Switch	Bypass Function Execution
PC	A6BSW			
ON	ON	OK	ON	Not executed (normal operation)
			OFF	
		NG	ON	
			OFF	
OFF	OFF	OK	ON	Executed (*1)
			OFF	Not executed (A6BSW stops)
		NG	ON	
			OFF	
OFF	ON	OK	ON	Executed (*2)
			OFF	
		NG	ON	
			OFF	
ON	OFF	OK	ON	Executed (*1)
			OFF	Not executed (A6BSW stops)
		NG	ON	
			OFF	

*1: Bypass function is executed by the built-in battery or the 12 VDC external power supply.

*2: Bypass function is executed by the 100/200 VAC power supply to the A6BSW. (The built-in battery and the 12 VDC external power supply are not consumed.)

Even when the 100/200 VAC power supply to the PC is ON, the above conditions are the same as those when the PC power is OFF when a link module has a fault.

IMPORTANT

When the battery backup switch is ON, the BATTERY CHARGE LED consumes about 8 mA-h of the built-in battery or 12 VDC external power supply regardless of the ON/OFF state of the 100/200 VAC power supply. The built-in battery is charged always when the 100/200 VAC power supply is ON. However, the 12 VDC external power supply is not charged, so that it is consumed when the 100/200 VAC power supply is ON.

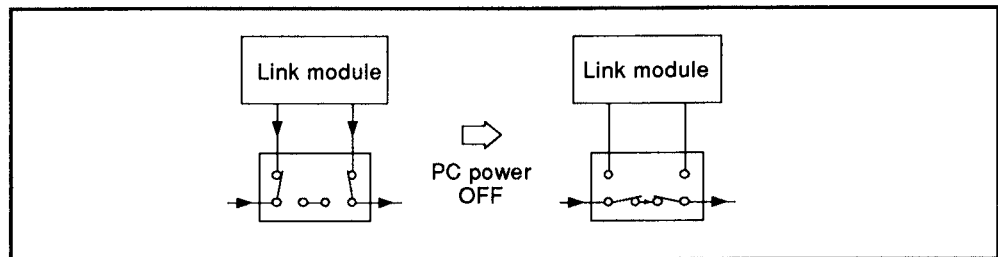
4.3.3 Slide switch for forced bypassing

Forced bypass is performed when the A6BSW is used as a relay station or when the link module in the host station is forcibly set for non contact. To perform forced bypass, the bypass mode should be set by using either the slide switch or remote bypass method.

(1) Normal mode

When the OFF state of the 100/200 VAC power supply to the PC is detected, or when the 100/200 VAC power supply to the A6BSW is OFF, the switch in the A6BSW is switched as shown below to perform the bypass operation.

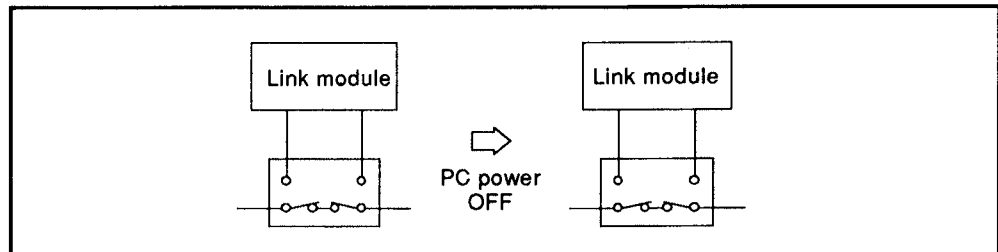
The bypass operation is performed also when fiber-optic cables are not connected to the STATION IN/OUT connectors.



(2) Bypass mode

The bypass operation is always performed regardless of the ON/OFF state of the 100/200 VAC power supply to the PC and A6BSW.

When the 100/200 VAC power supply to the A6BSW is ON, the 100/200 VAC power supply is used to hold the mode in the bypass state. When the 100/200 VAC power supply to the A6BSW is OFF, the built-in battery or 12 VDC external power supply is used to hold the mode in the bypass state.



When the A6BSW is used as a relay station, it is necessary to set it for the bypass mode (the forced bypass slide switch is in the BY-PASS position or the remote bypass external contact is ON).

(3) Operation modes according to the forced bypass slide switch settings and the remote bypass external contact states are as given below.

Forced Bypass Slide Switch	Remote Bypass External Contact	Mode
NORMAL	OFF	Normal
NORMAL	ON	Bypass
BY-PASS	ON	Bypass
BY-PASS	OFF	Bypass

5. WIRING AND INSTALLATION

This section gives the method for wiring to the A6BSW terminal block and the connections of fiber-optic cables.

5.1 Precautions for Wiring

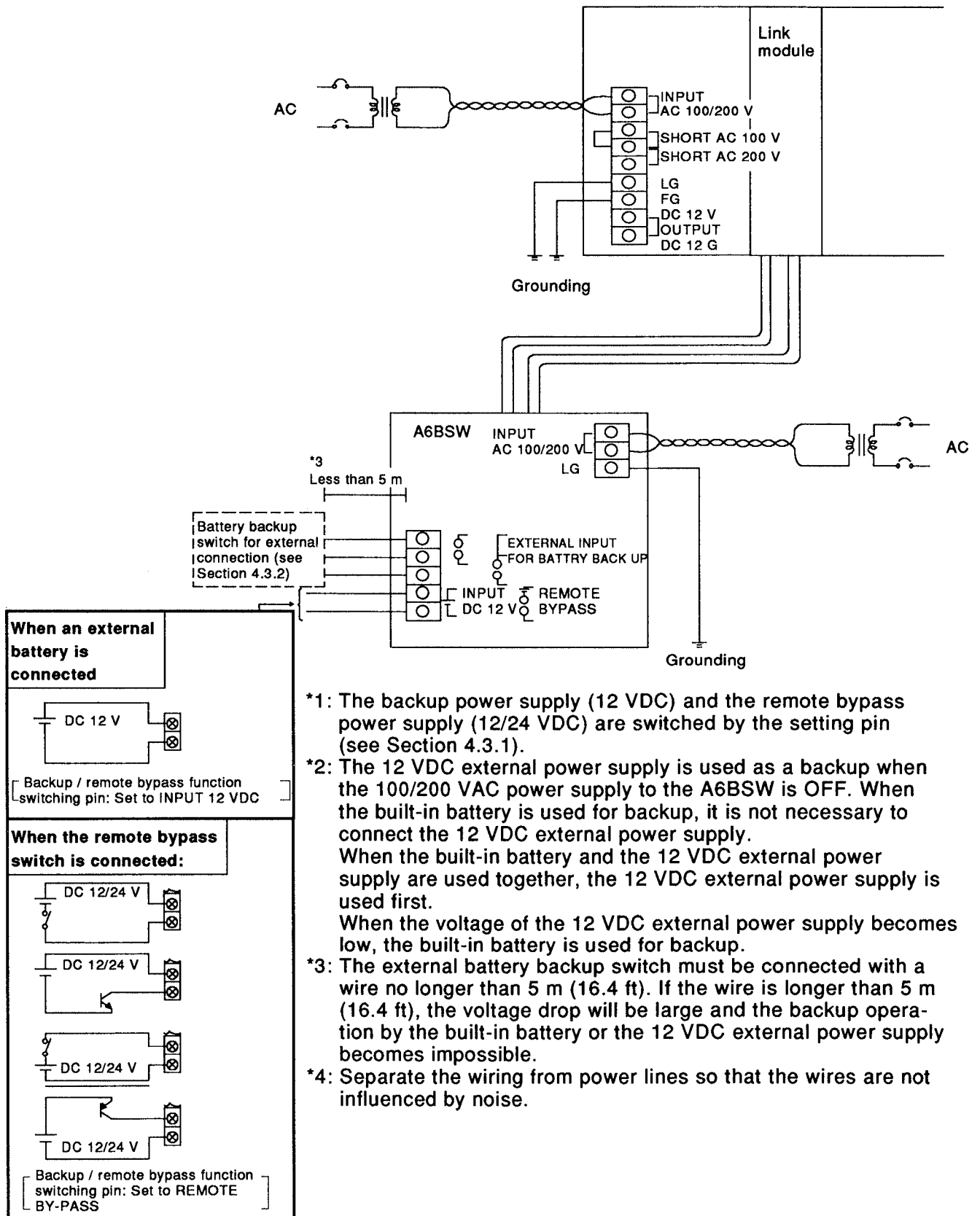
Precautions for wiring to the terminal block for the 100/200 VAC power supply, 12 VDC external power supply for backup, battery voltage charging state detecting circuit, etc. and those for connecting the fiber-optic cables are as given below.

- (1) When making wiring for the 100/200 VAC power supply to the A6BSW, refer to the **User's Manual of your CPU module**.
- (2) When connecting the 12 VDC external power supply for backup, make sure that the +/- polarity of the power supply is correct.
- (3) Since the A6BSW is provided with sufficient anti-noise measures, it can operate without grounding under ordinary noise conditions. When making grounding, refer to the **User's Manual of your CPU module**.
- (4) Do not treat or handle the fiber-optic cables as mentioned below. If the fiber-optic cables are handled as mentioned below, the cable will be damaged and correct data link will be impossible.
 - (a) Bending the cable to a radius smaller than the allowable minimum bending radius.
 - (b) Compressing the cable with a sharp rigid material.
 - (c) Twisting the cable to the extreme.
 - (d) Pulling the connector away from the cable.
 - (e) Pulling the cable as to cause tension.
 - (f) Stamping on the cable.
 - (g) Putting things on the cable.
 - (h) Damaging the insulation of the cable.
- (5) Do not remove the protective cap from the cable unless the cable is connected. If the cable is left unused without the protective cap, the connector will be contaminated with dust and transmission loss will become large.

Also, do not remove the cover from the module-side connector until the fiber-optic cable is ready to be installed.
- (6) Be sure to shut off all phases of the external power supply used in the system before connecting or disconnecting fiber-optic cables.

5.2 Wiring to the Terminal Block

The following gives an example of wiring to the terminal block of the A6BSW.



- *1: The backup power supply (12 VDC) and the remote bypass power supply (12/24 VDC) are switched by the setting pin (see Section 4.3.1).
- *2: The 12 VDC external power supply is used as a backup when the 100/200 VAC power supply to the A6BSW is OFF. When the built-in battery is used for backup, it is not necessary to connect the 12 VDC external power supply. When the built-in battery and the 12 VDC external power supply are used together, the 12 VDC external power supply is used first. When the voltage of the 12 VDC external power supply becomes low, the built-in battery is used for backup.
- *3: The external battery backup switch must be connected with a wire no longer than 5 m (16.4 ft). If the wire is longer than 5 m (16.4 ft), the voltage drop will be large and the backup operation by the built-in battery or the 12 VDC external power supply becomes impossible.
- *4: Separate the wiring from power lines so that the wires are not influenced by noise.

POINTS

- (1) Use thick cables (max. 2 mm²) for the 100/200 VAC power supply and the 12 VDC external power supply and start twisting the cables at the joint terminal.
Use a solderless terminal with an insulation sleeve to prevent short-circuiting when a terminal screw becomes loose.
- (2) The wire connected to the LG terminal must be connected to the ground. When a grounding wire is not connected to the ground, do not connect the wire to the LG terminal.
If a wire is connected to the LG terminal and not connected to the ground, the A6BSW will be easily influenced by noise or the possibility of electric shock when the metal part of the unit is touched. This is due to the fact that half of the input voltage appears at the LG terminal.

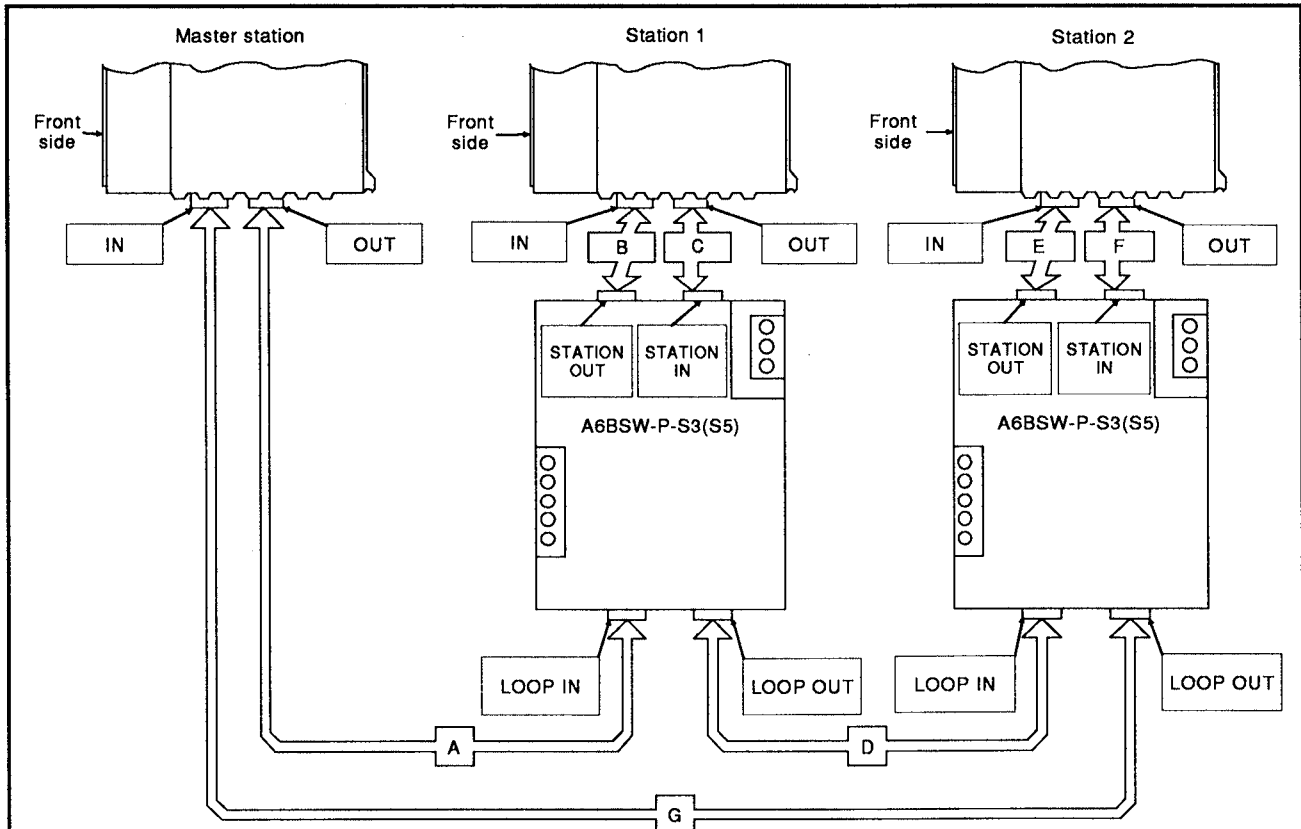
5.3 Connecting the Fiber-Optic Cables

The method for connecting the fiber-optic cables to the A6BSW is explained below.

5.3.1 Connecting method

The A6BSW has four fiber-optic cable connectors; two on the top and two on the bottom, as shown below. Make connections to the link modules in the host station and other station as shown below.

(1) When using the bypass function (A6BSW-P-S3(S5, S6, or S7) is used)



(a) A to G in the figure indicate the fiber-optic cables.

(b) Fiber-optic cable extension length

1) Individual fiber-optic cable length

When fiber-optic cables A to G are SI cables, the maximum length is 1 km (0.62 mile). When they are GI cables, the maximum length is 2 km (1.24 mile).

2) Overall distance of the system

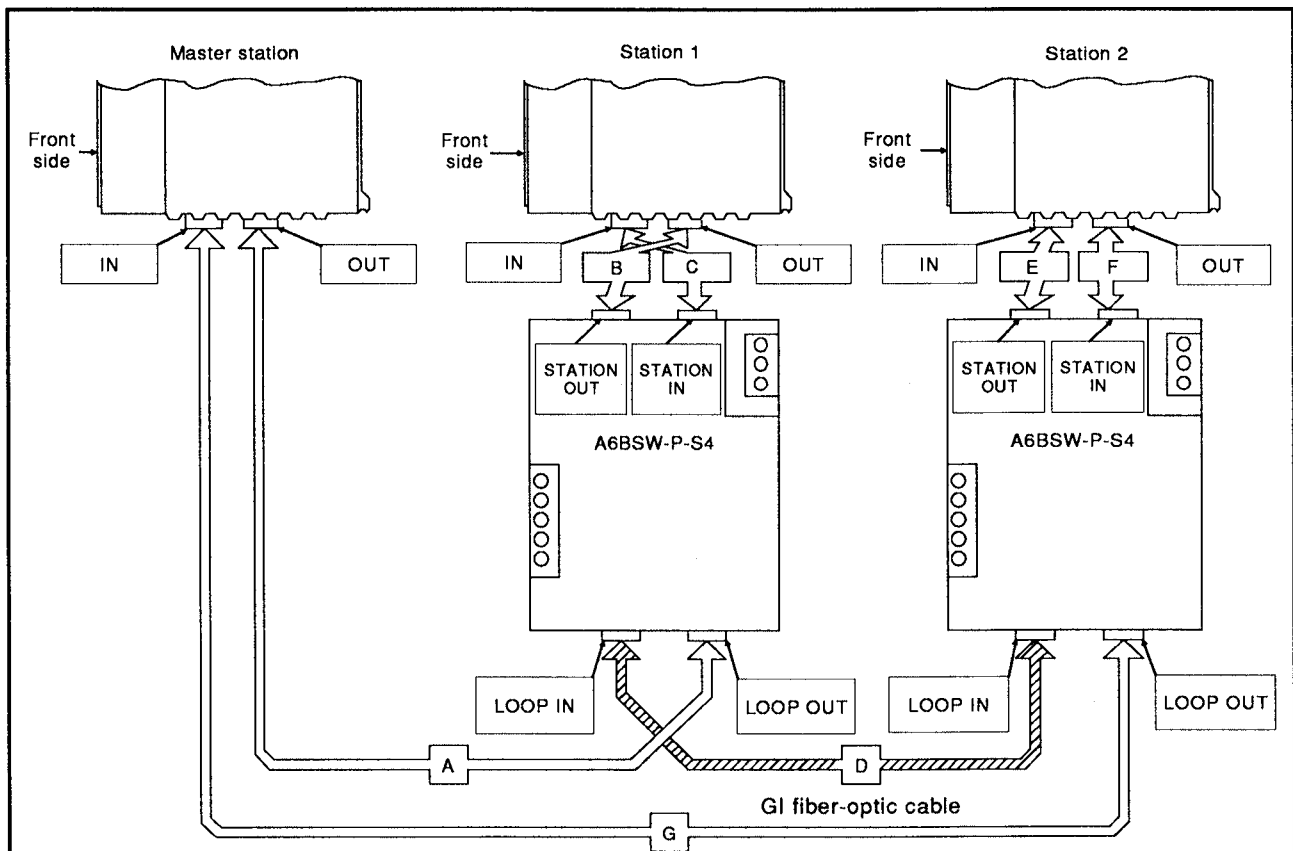
$A + B + C + D + E + F + G \leq 10 \text{ km (6.21 mile)}$ is possible.

(c) When the A6BSW is used for the bypass function, always follow the connecting method shown above in which one A6BSW is connected to one link module.

Any connection method other than that shown above will not execute the bypass function correctly.

(2) When using the bypass function (A6BSW-P-S4 is used)

The connecting method when lengthening the distance between stations is as shown below.



(a) A, B, C, E, F, and G in the figure indicate the SI/H-PCF fiber-optic cables.
D indicates a GI fiber-optic cable.

(b) Fiber-optic cable extension length

1) Individual fiber-optic cable length

When fiber-optic cables A to G are SI cables, the maximum length is 1 km (0.62 mile). When they are GI cables, the maximum length is 2 km (1.24 mile).

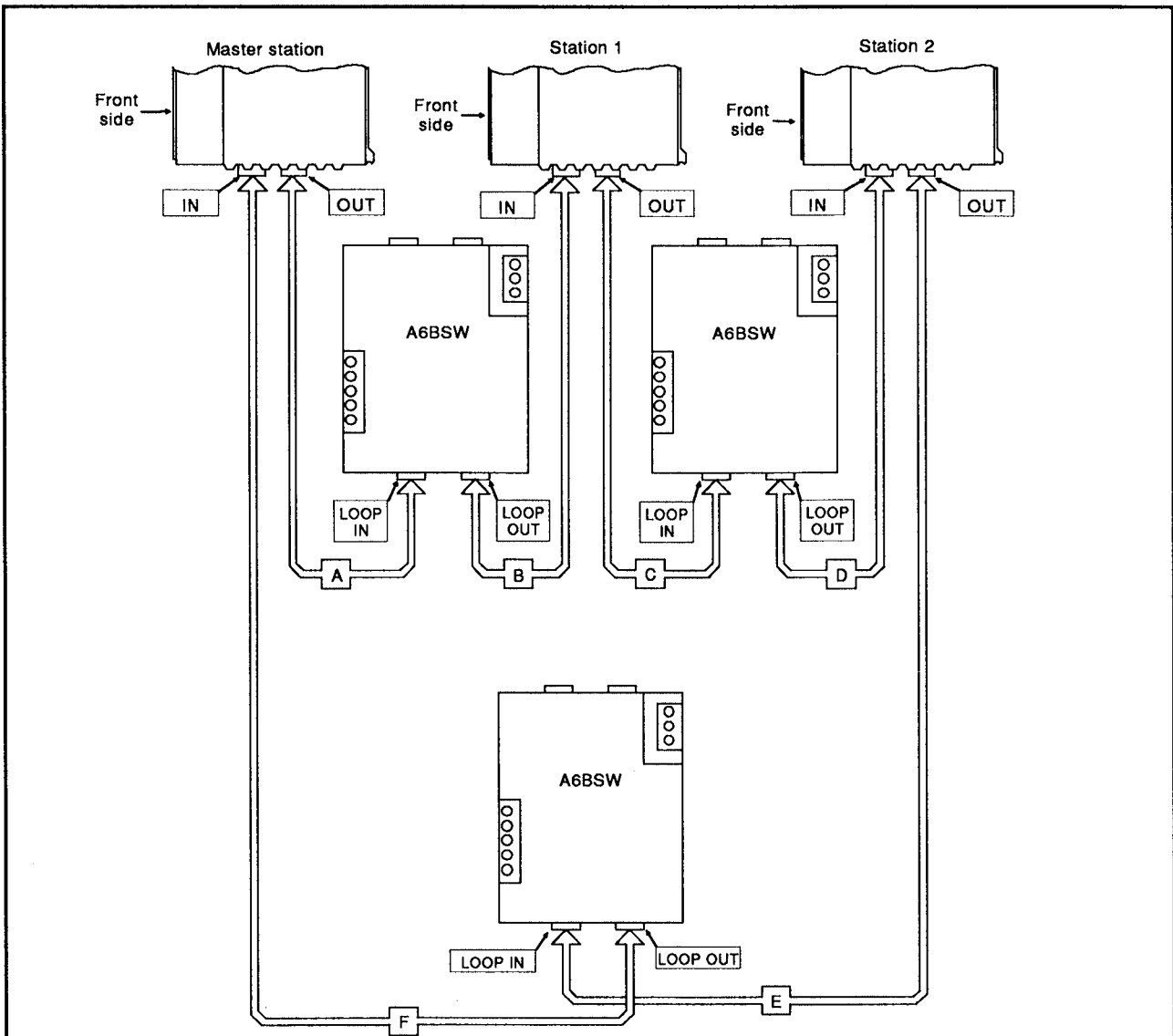
2) Overall distance of the system

$A + B + C + D + E + F + G \leq 10$ km (6.21 mile) is possible.

(c) When the A6BSW is used for the bypass function, always follow the connecting method shown above in which one A6BSW is connected to one link module.

Any connection method other than that shown above will not execute the bypass function correctly.

(3) When using the A6BSW as a relay station



(a) A to F in the figure indicate the fiber-optic cables.

(b) Fiber-optic cable extension length

1) Individual fiber-optic cable length

When fiber-optic cables A to F are SI cables, the maximum length is 1 km (0.62 mile). When they are GI cables, the maximum length is 2 km (1.24 mile).

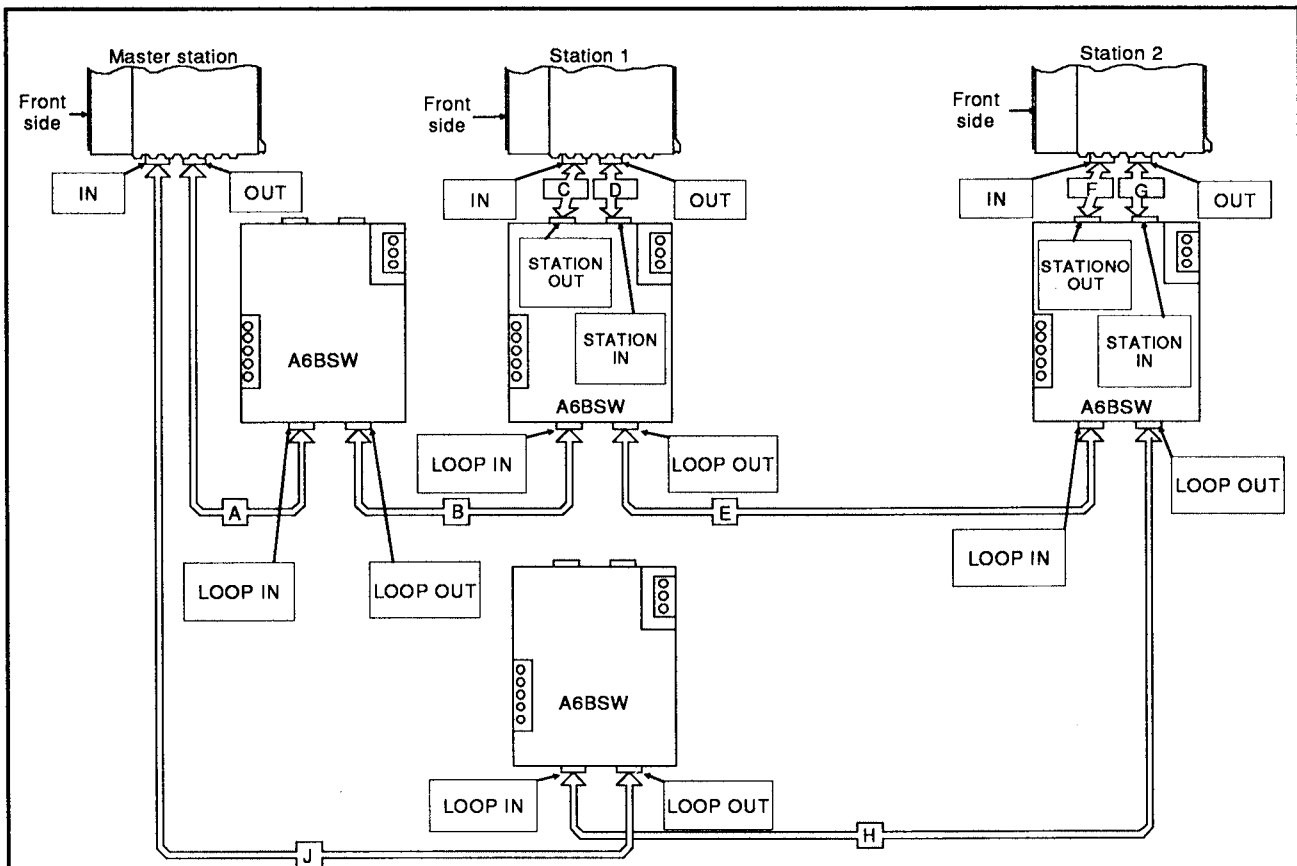
2) Overall distance of the system

$A + B + C + D + E + F + G \leq 10 \text{ km (6.21 mile)}$ is possible.

(c) When the A6BSW is used as a relay station, always follow the connecting method shown above.

Only one A6BSW can be used between two stations when the A6BSW is used as a relay station.

(4) The mixed connecting method when using the bypass function and also as a relay station



(a) A to I in the figure indicate the fiber-optic cables.

(b) Fiber-optic cable extension length

1) Individual fiber-optic cable length

When fiber-optic cables A to I are SI cables, the maximum length is 1 km (0.62 mile). When they are GI cables, the maximum length is 2 km (1.24 mile).

2) Overall extension of the system

$A + B + C + D + E + F + G + H + I \leq 10 \text{ km (6.21 mile)}$ is possible.

(c) When the A6BSW is used for the bypass function and also as a relay station, always follow the connecting method shown above or that mentioned in Section 5.3.1 (1) or (2).

(d) Only one A6BSW when used for the bypass function is connected to one link module.

(e) Only one A6BSW can be used between two stations when the A6BSW is used as a relay station.

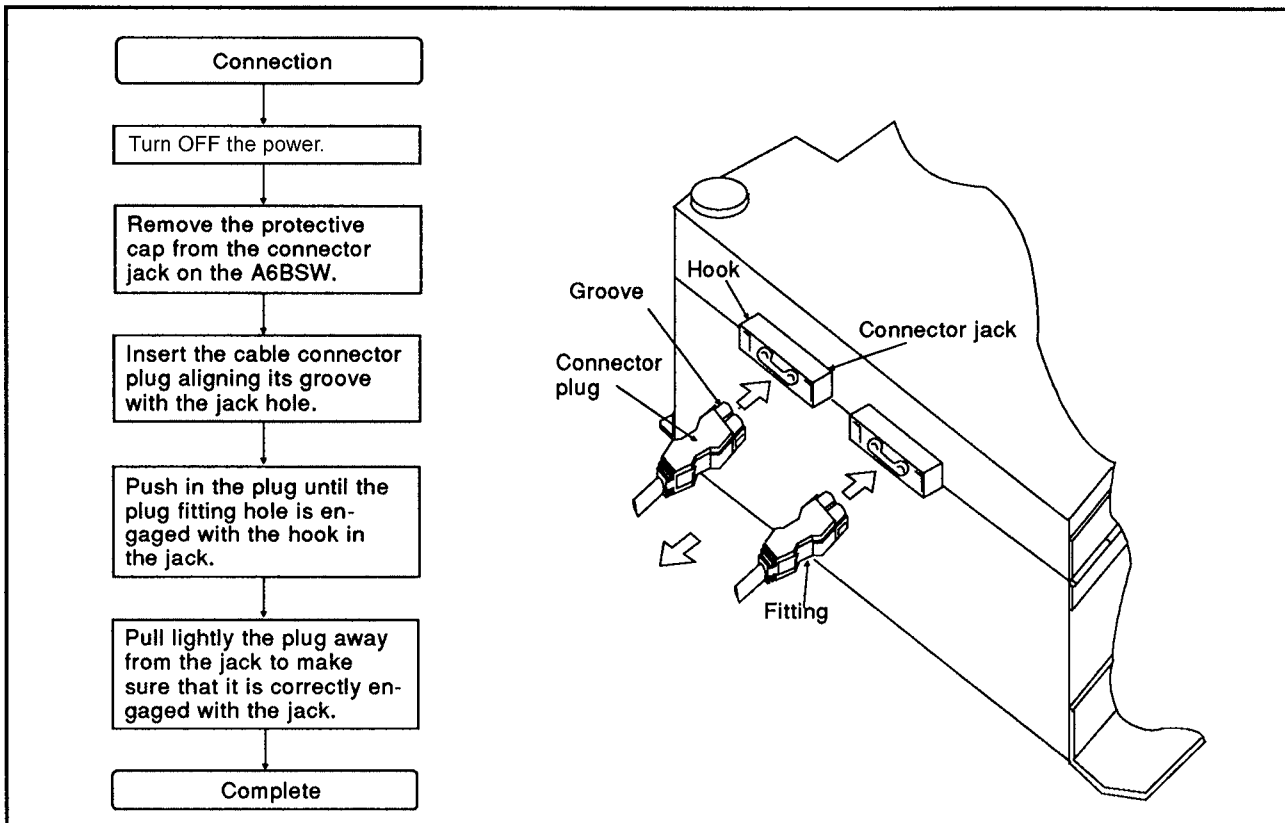
(f) The maximum number of A6BSWs connectable in a loop when used for the bypass function and also as relay stations is as mentioned below.

Number of slave stations connected in one loop (local stations / remote I/O station) + 2 (units)

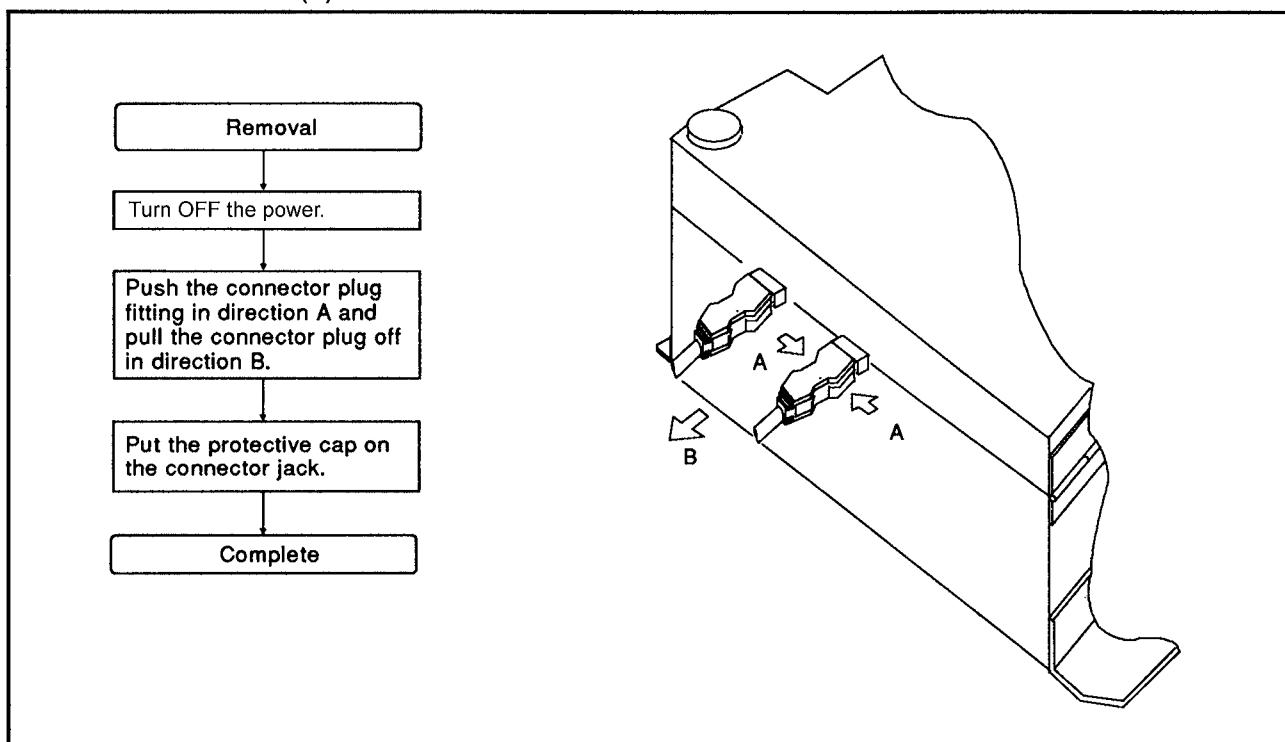
5.3.2 Connection and removal procedures

The connection and removal procedures of fiber-optic cables for the A6BSW are as given below.

(1) Connection

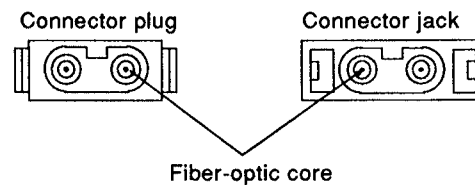


(2) Removal



POINTS

- (1) Use caution not to touch the fiber-optic cores in the connector plug and jack, and protect them against dirt and dust. Put the protective cap on the connector plug when the cables are not used. If such parts are contaminated, transmission loss becomes large and communications may often be disabled. If contaminated with finger oil or dust, wipe it off with a soft cloth.



- (2) When fiber-optic cable is connected, there are restrictions for the bending radius of the cable. Check the cable used for specific details.
- (3) Maintain the bending radius of the fiber-optic cable within the allowable range using a tool for securing the fiber-optic cable bending radius. This tool may be purchased from Mitsubishi Electric System & Service Co., Ltd. or your nearest dealer. Please inquire for more information.

5.4 Installing the A6BSW

This section gives the installing positions when installing the A6BSW to a panel, etc.

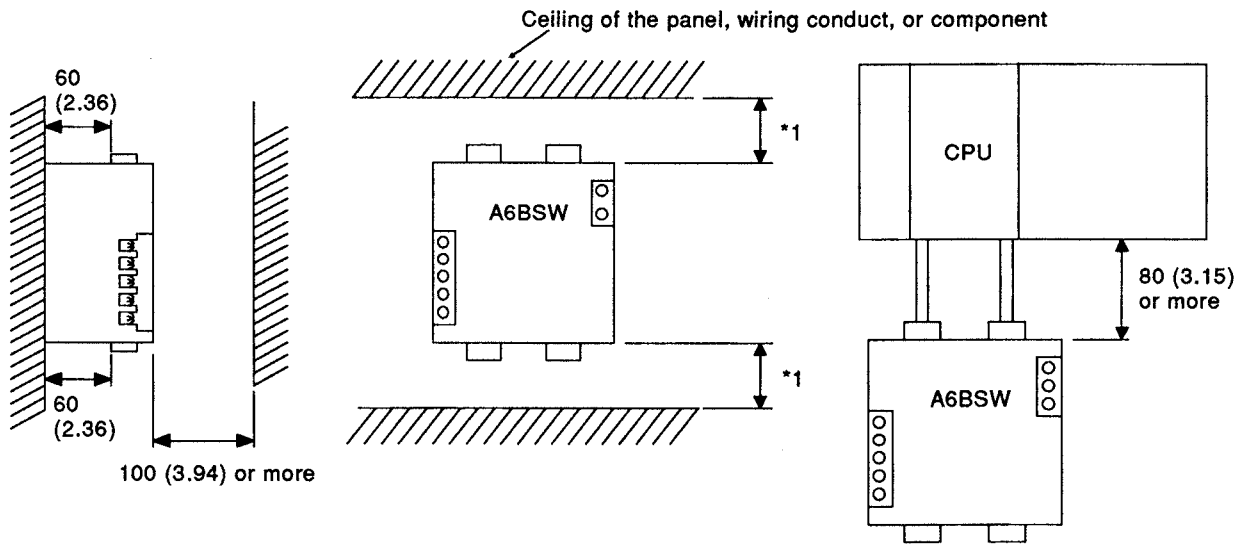
5.4.1 Precautions for installation

The following precautions must be observed when installing the A6BSW to a panel, etc.

- (1) Provide a clearance of 80 mm (3.15 inch) or more between the top side of the A6BSW and a wall. This is required for ventilation and to allow for the A6BSW easily replaced.
- (2) Do not install the A6BSW to be in a vertical or horizontal position. Installing the A6BSW in such positions will hamper ventilation.
- (3) Install the A6BSW on a flat wall. If it is mounted on an uneven wall, the body and the printed circuit boards will be strained and may cause malfunction.
- (4) Separate the A6BSW from vibrating sources such as a large electromagnetic contactor and no-fuse circuit breaker. Install the A6BSW to a separate panel.
- (5) Use wiring conducts if necessary. When the conducts are positioned closer to the top or the bottom side than the dimensions given in Fig. 5.1, observe the following points:
 - (a) When a conduct is located over the top side of the A6BSW, make the height of the conduct to 50 mm (1.97 inch) or less for ventilation.
 - (b) When a conduct is located under the bottom side of the A6BSW, mount the conduct so that the fiber-optic cables can be connected considering the allowable minimum bending radius of the cable.

5.4.2 Installation

The installation positions of the A6BSW are as given below.



*1..... When 4.5 (0.18)-dia. fiber-optic cable is used: 100 (3.94) or more
 When 8.5 (0.34)-dia. fiber-optic cable is used: 130 (5.12) or more

Fig. 5.1 Top and bottom clearances

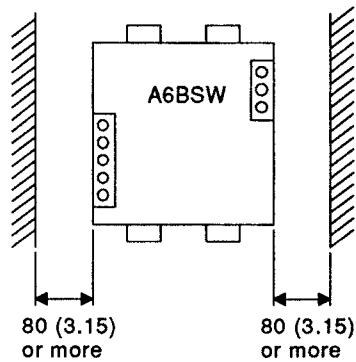


Fig. 5.2 Right and left clearances

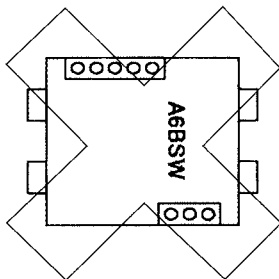


Fig. 5.3 Installing on its side (Unallowable)

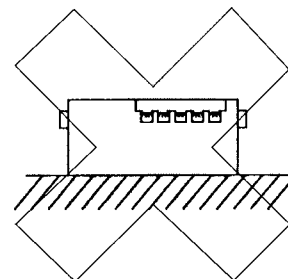
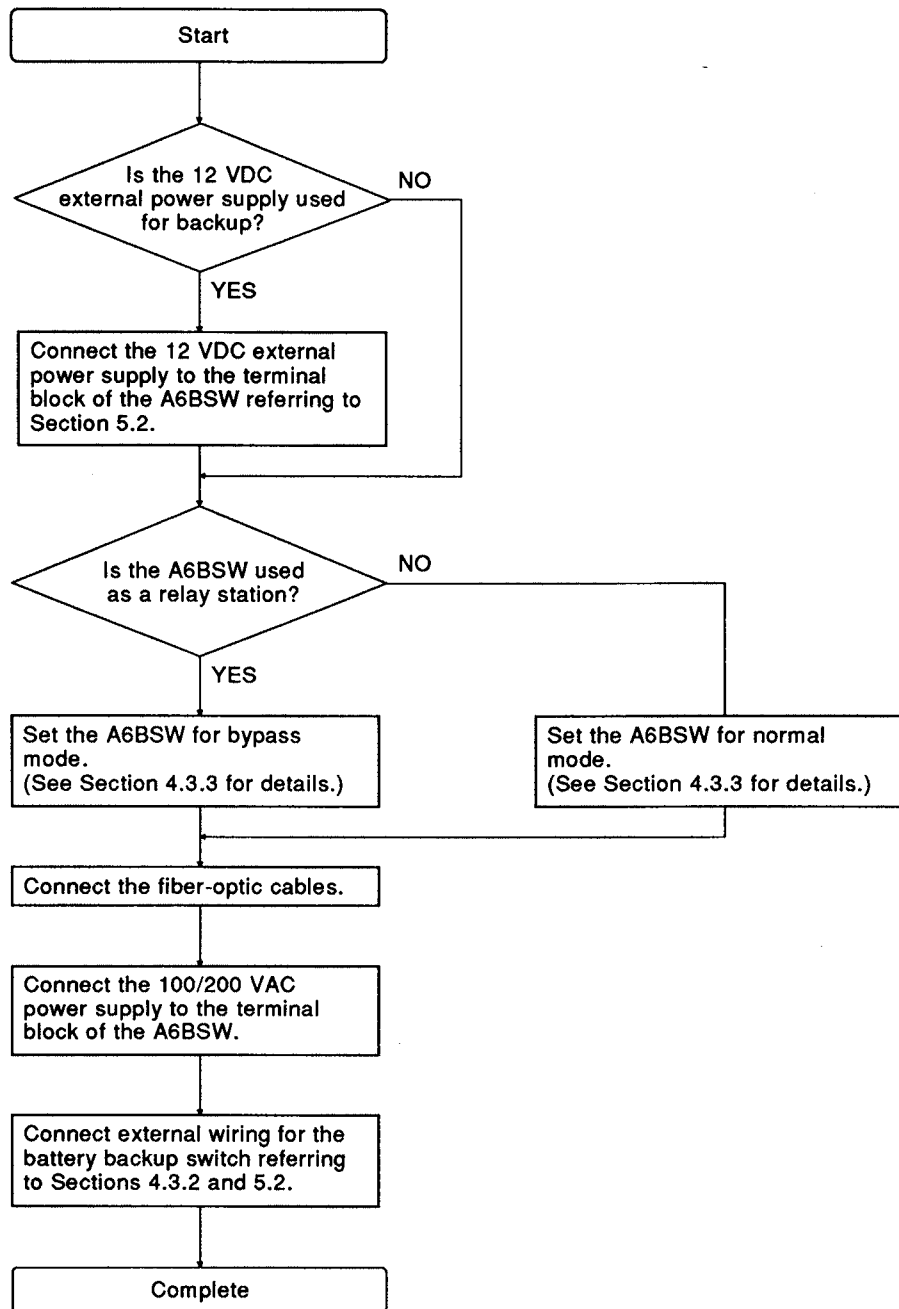


Fig. 5.4 Horizontal position (Unallowable)

Unit: mm (inch)

6. TEST OPERATION PROCEDURE

The procedure for test operation after the installation of the A6BSW is as given below.

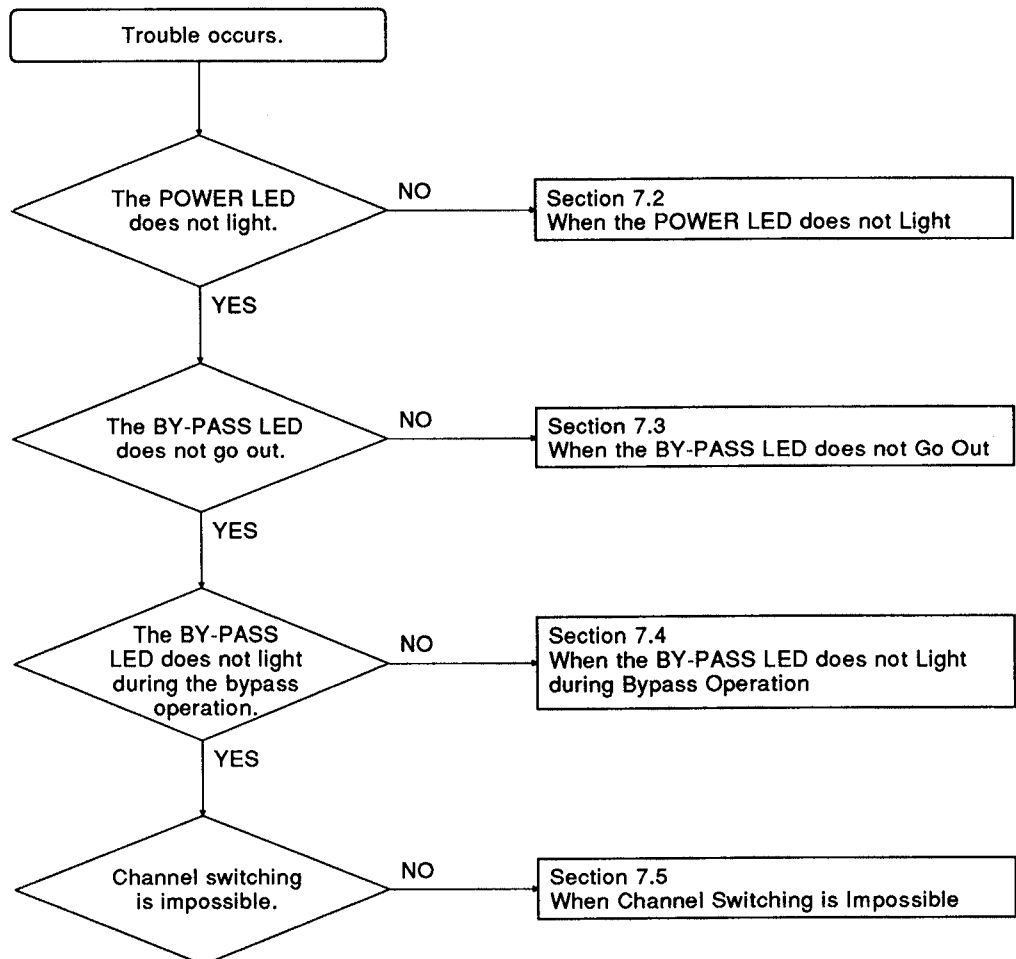


7. TROUBLESHOOTING

This section gives the troubleshooting procedures for the A6BSW in flow charts.

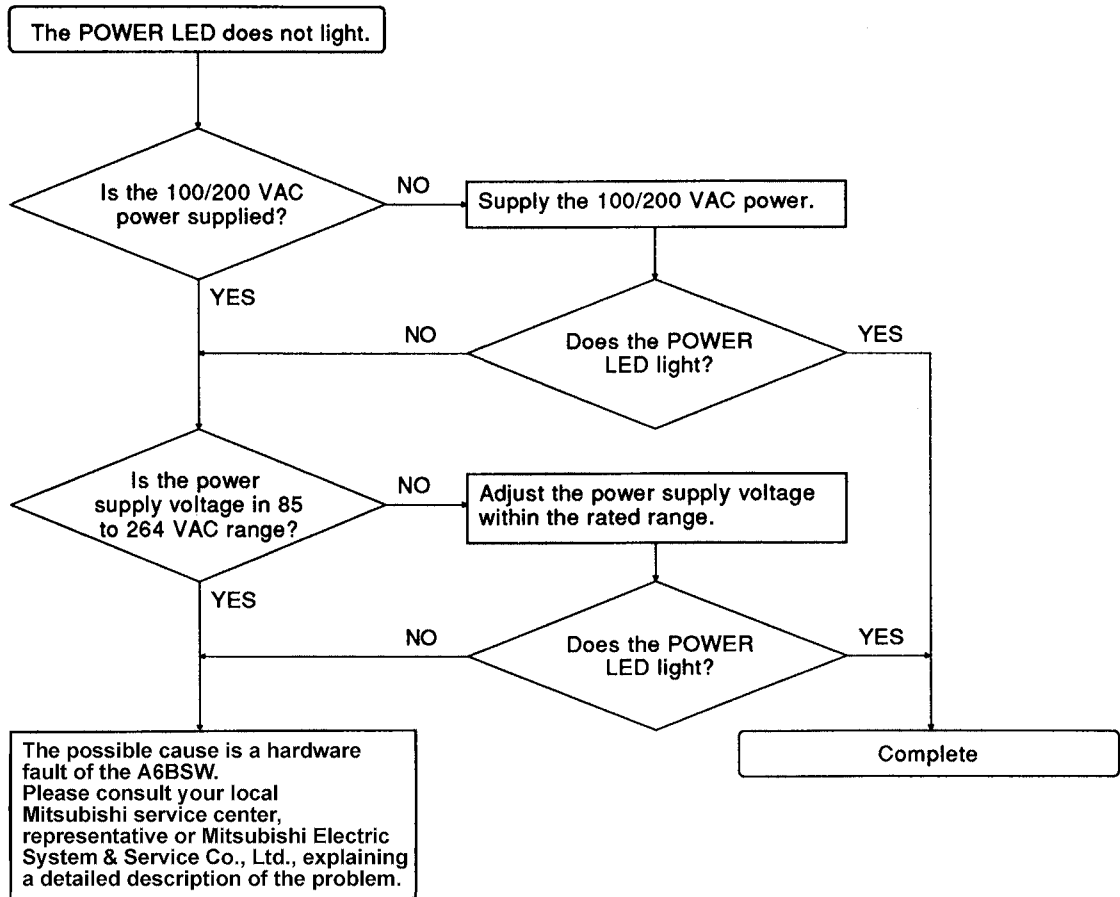
7.1 General Troubleshooting Flow

The operational troubles with the A6BSW are classified by phenomenon as given below.



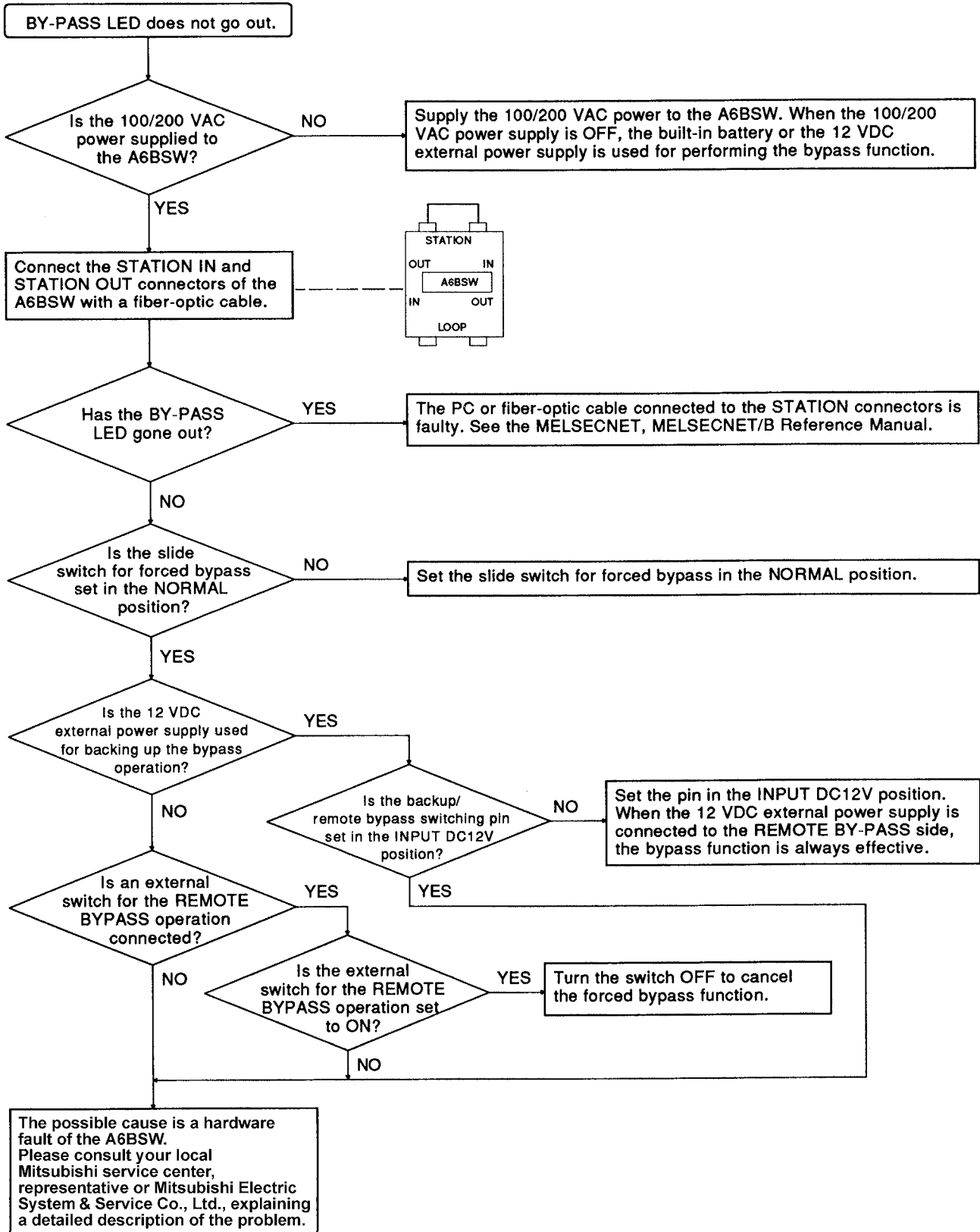
7.2 When the POWER LED does not Light

The following flow chart gives the troubleshooting procedure when the POWER LED does not light when the 100/200 VAC power is supplied or during operation.



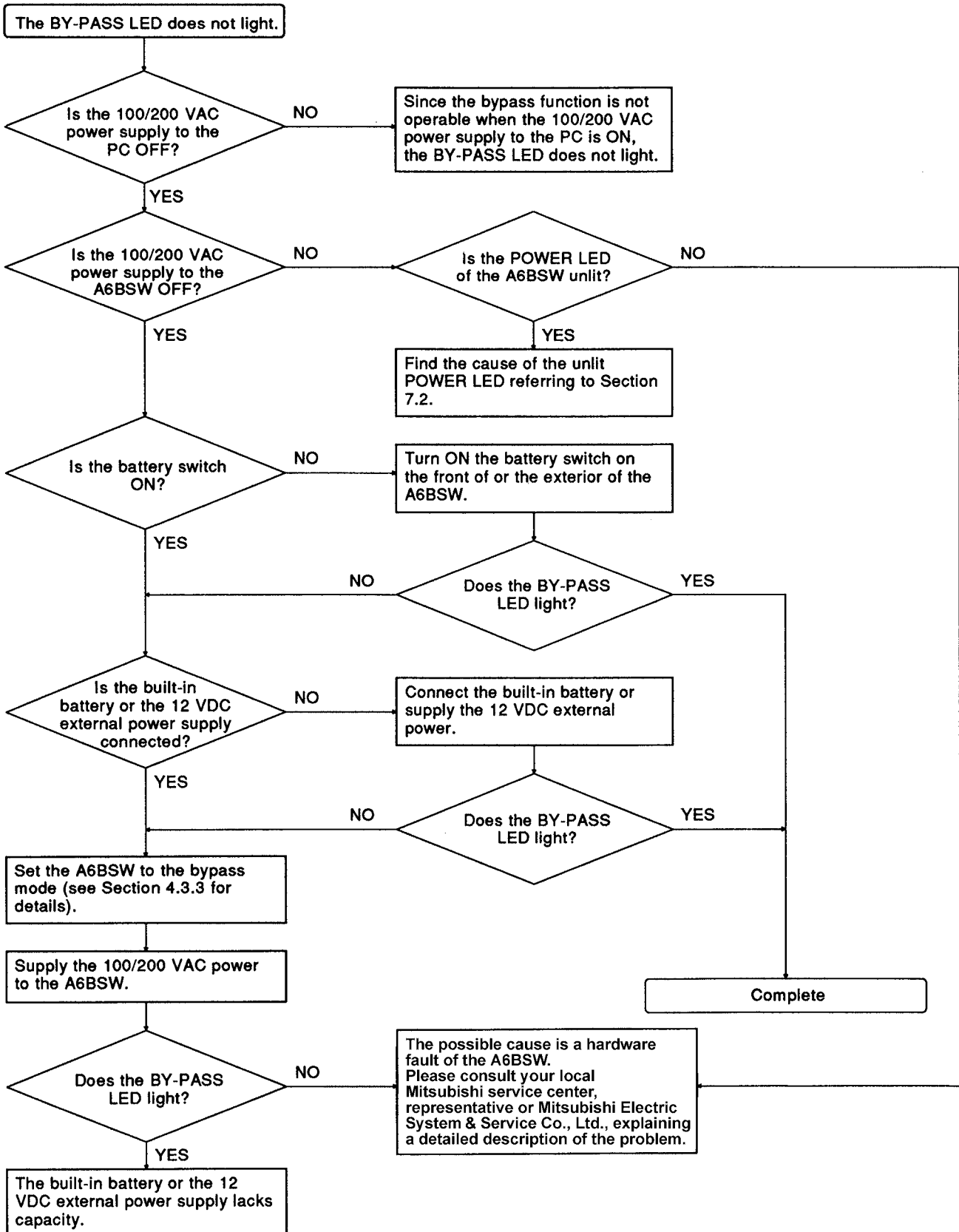
7.3 When the BY-PASS LED does not Go Out

The following flow chart gives the troubleshooting procedure when the BY-PASS LED does not go out (the bypass function cannot be canceled) when the PC power is turned ON.



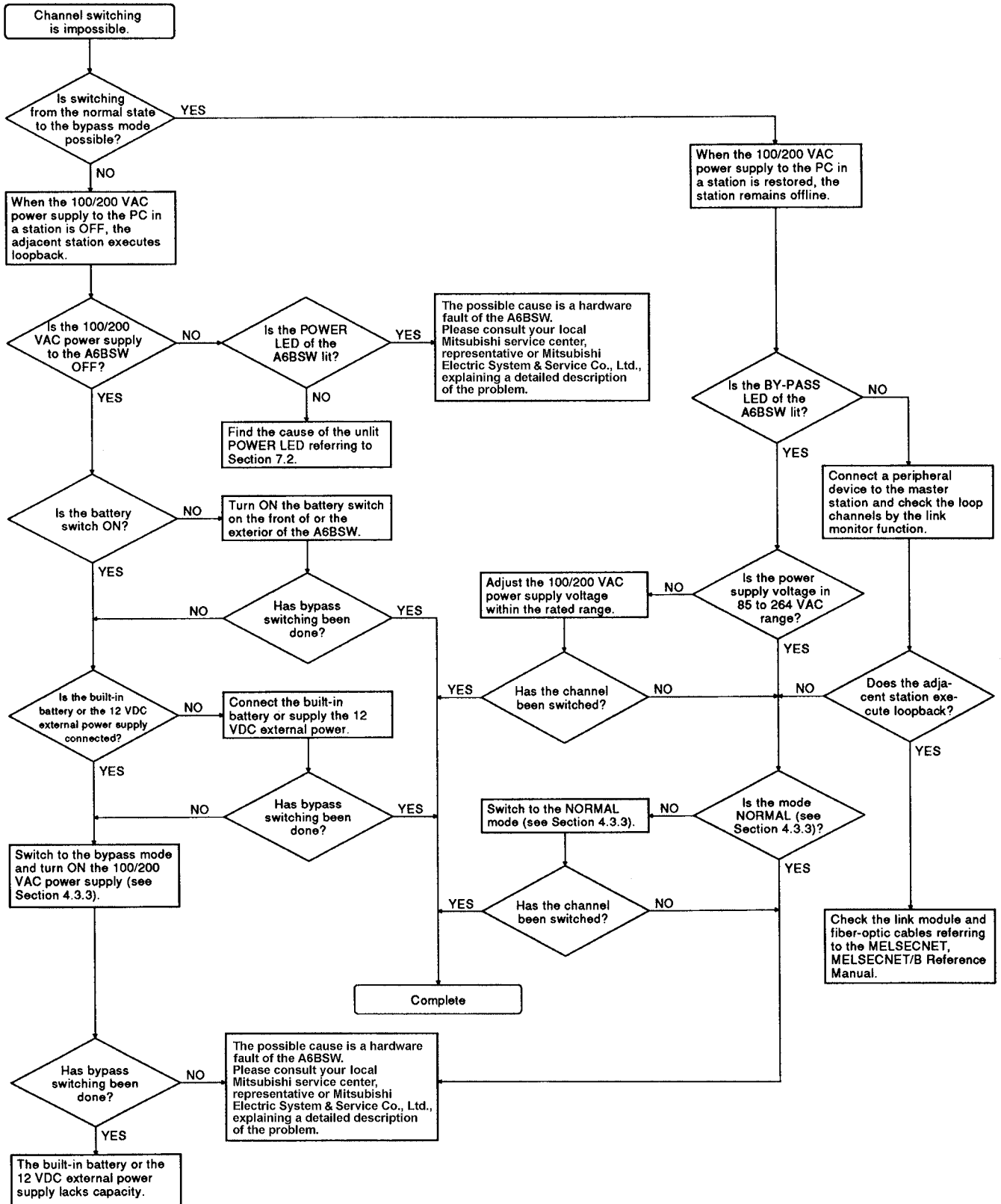
7.4 When the BY-PASS LED does not Light during Bypass Operation

The following flow chart gives the troubleshooting procedure when the BY-PASS LED does not light when the operation mode is switched to BY-PASS or during forced bypass operation.



7.5 When Channel Switching is Impossible

The following flow chart gives the troubleshooting procedure when bypass switching when the 100/200 VAC power supply is OFF or channel switching after the 100/200 VAC power supply is restored is impossible.



8. MAINTENANCE AND INSPECTION

This section gives daily and periodical inspection items to keep the A6BSW at the best of its operating condition.

8.1 Inspection Items

Daily and 6-month inspection items are as given in the table below.

No.	Inspection Item		Inspection Method	Judging Criteria	Corrective Action
1	Ambience	Temperature	Use a thermometer.	0 to 55 °C	When the A6BSW is installed in a panel, the temperature and humidity in the panel should be measured.
		Humidity	Use a hygrometer.	10 to 90% RH	
		Atmosphere	Measure corrosive gases.	No corrosive gas is allowed.	
2	Installing condition	Looseness and play	Try to move the A6BSW.	The A6BSW must be securely mounted.	Retighten the mounting screws.
		Sticking dirt and dust	Visual check	No sticking dirt is allowed.	Remove and clean.
3	Voltage check	100/200 VAC power supply	Measure the voltage across the 100/200 VAC terminals.	85 to 264 VAC	Change the power supply or transformer tap.
		External power supply for bypass	Measure the voltage across the 12 VDC terminals.	10.2 to 13.2 VDC	
		Built-in battery for bypass	Measure the voltage at the A6BSW-BAT battery connector.	7.2 V or more at 100% charged condition	Replace the built-in battery.
4	Connection conditions	Loosened terminal screws	Tighten with a screwdriver.	Looseness is not allowed.	Retighten.
		Interval of solderless terminals	Visual check	Intervals must be appropriate.	Correct.
		Loosened fiber-optic cable connector	Lightly pull the connector.	Connector should not become disengaged.	Insert the connector securely.
5	Connection of the built-in battery		Visual check	Must be securely connected.	Connect it securely.
6	Indicator LED	POWER LED	Check if it lights.	Lights. (Faulty if it does not light.)	See Section 7.2.
		BATTERY CHANGE LED	Check if it lights when the BATTERY CHECK switch is turned ON.	Lights. (The backup power supply voltage is low if it does not light.)	Charge the built-in battery.

8.2 Storage

The following precautions must be observed when storing the A6BSW as a single unit or as installed to a panel or machine.

(1) Avoid the following places to store the A6BSW:

(a) Places where ambient temperature is out of the ranges mentioned below.

- A6BSW single unit (without an A6BSW-BAT battery): -10 to 70 °C
- A6BSW-BAT battery single unit: -30 to 45 °C
- A6BSW with an A6BSW-BAT built-in battery: -10 to 45 °C

(b) Places where ambient humidity is out of the 10 to 90% RH range.

- (c) Places where dew (condensation) occurs due to sudden temperature changes.
 - (d) Places exposed to rain, wind, or sunlight.
 - (e) Places where corrosive or inflammable gas exists.
 - (f) Places where a large amount of dust, iron powder and other conductive powder, oil mist, salt, or organic solvent exists.
- (2) When storing the A6BSW with the fiber-optic cables detached from the A6BSW, put the protective cap on the fiber-optic cable connectors of the A6BSW to guard them from dust.

8.3 Replacing the Built-In Battery

The replacement term and procedure of the built-in battery are as explained below.

8.3.1 Replacement term

The replacement term of the A6BSW-BAT battery used as the auxiliary power when bypassing is as explained below.

The A6BSW-BAT built-in battery is a Ni-Cd battery and is charged when the 100/200 VAC power supply is ON. When the 100/200 VAC power supply is turned OFF, the built-in battery is used to back up the bypass operation. In short, the built-in battery is charged and discharged as the 100/200 VAC power supply is turned ON and OFF.

When the built-in battery is 100% charged, it can back up the bypass operation for 6 hours. If the built-in battery is used to its service life, it will not be able to back up even after 40 hours of charging or it can back up less than 3 hours.

It is recommended, as a preventive maintenance method, to replace the built-in battery before it is used to its service life.

The built-in battery's service life will be determined as mentioned below.

- (1) Referring to the date of manufacture indicated on the nameplate of the A6BSW-BAT battery, the service life will be;
 - 5 years if it is used below 40 °C, and 3 years if it is used in the 41 °C to 55 °C range.
- (2) The battery will be used to life when it is charged to 100% 500 times.
- (3) The battery will be used to life when the length of the backup time becomes less than 4 hours after it is 100% charged (40 continuous hours of charging).

8.3.2 Replacement procedure

The replacement procedure of the A6BSW-BAT battery is as given below.

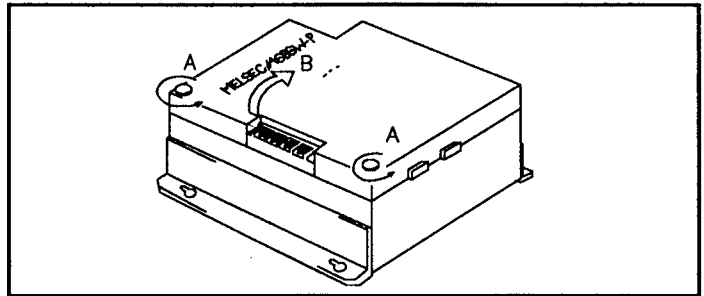
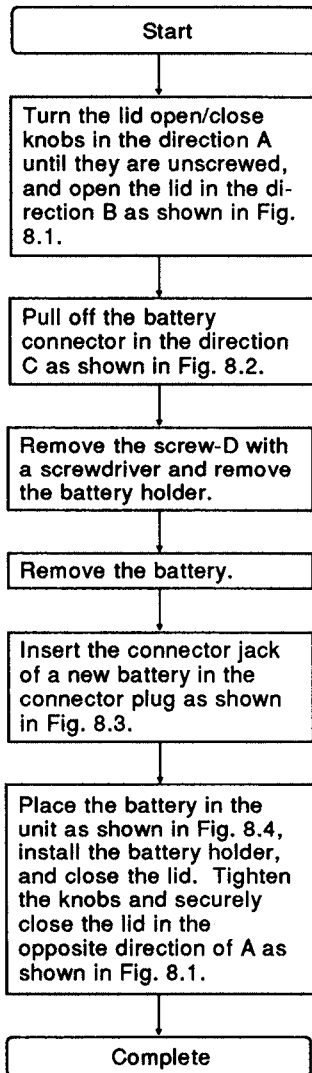


Fig. 8.1

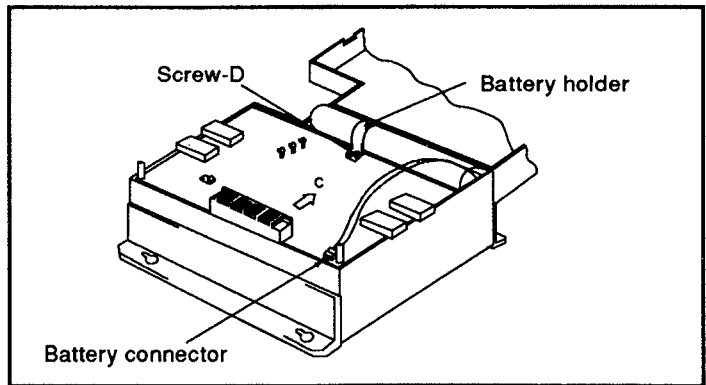


Fig. 8.2

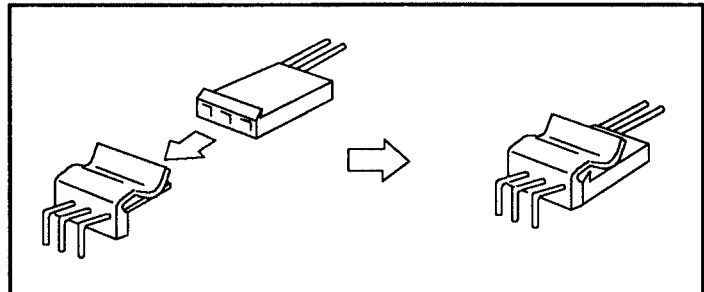


Fig. 8.3

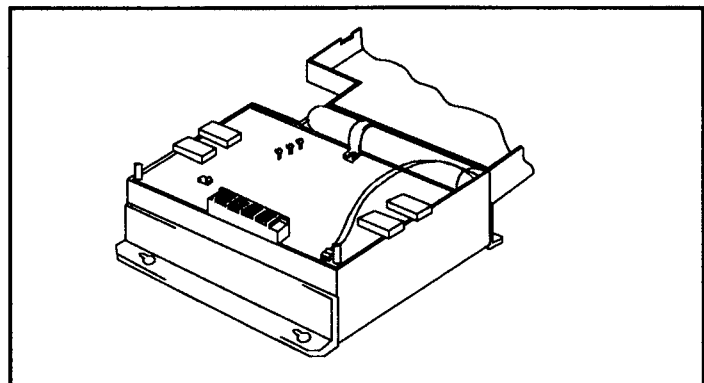


Fig. 8.4

APPENDICES

APPENDIX 1 FIBER-OPTIC CABLE SPECIFICATIONS

The specifications of the fiber-optic cables used for the MELSECNET optical data link are as given below.

The fiber-optic cable requires expertise and special tools to connect the connector plug and cable, and also the connector plug is designed specifically for the cable. When purchasing the cable, therefore, please consult your nearest Mitsubishi Electric System & Service Co., Ltd.

(1) SI-type fiber-optic cable

Item	SI (Multi particulate glass)	H-PCF (Plastic clad)	GI (Quartz glass)
Interstation distance	1km	1km	2km
Transmission loss	12dB/km	6dB/km	3dB/km
Core diameter	200 μ m	200 μ m	50 μ m
Clad diameter	220 μ m	250 μ m	125 μ m
Primary membrane	250 μ m	—	—
Applicable connector	F06/F08 or equivalent (JIS C5975/5977 conformance)		

REMARK

Prepare the following types of optical cables.

A type: Cable for connection inside control panel.

B type: Cable for connections between outside control panels.

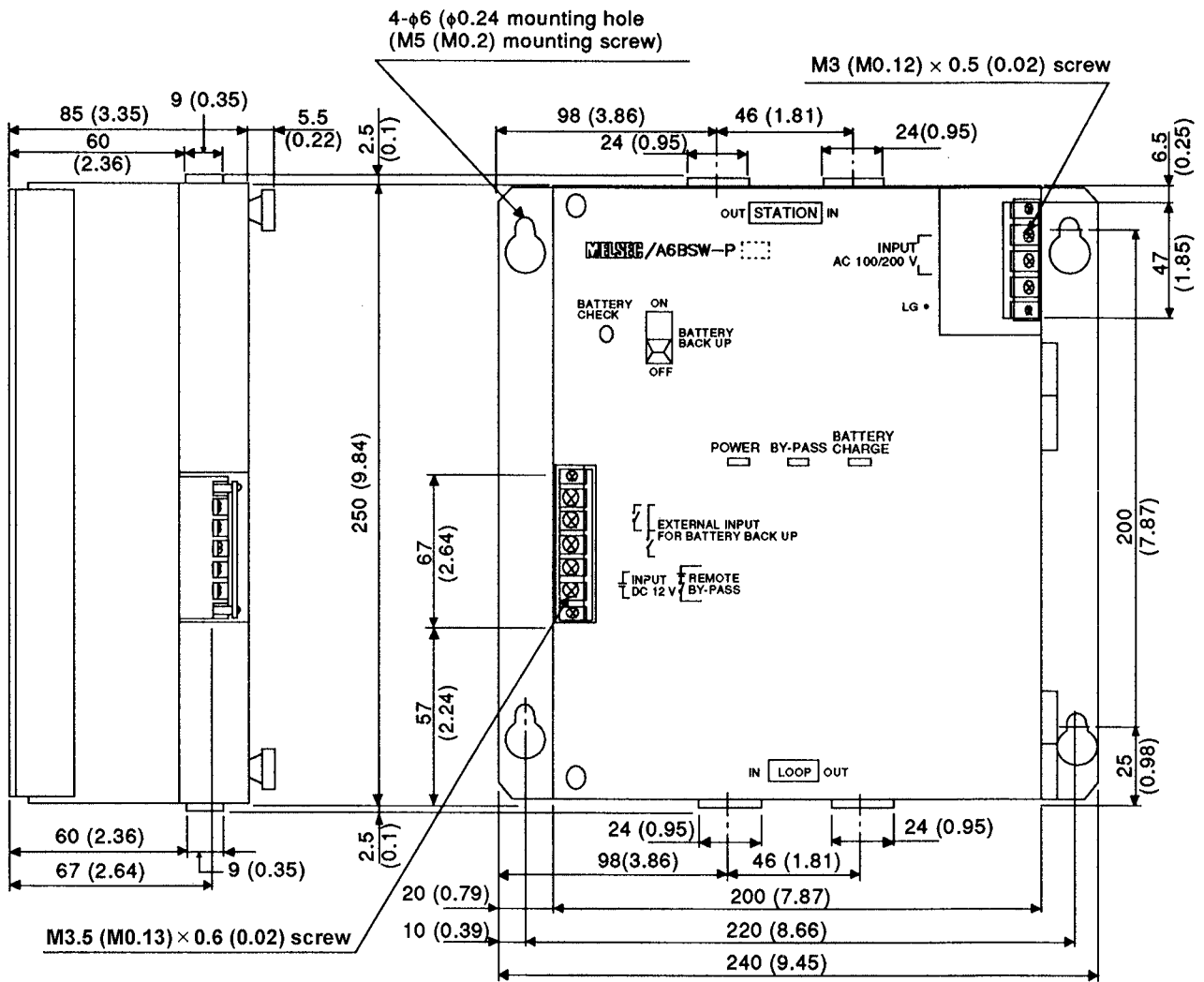
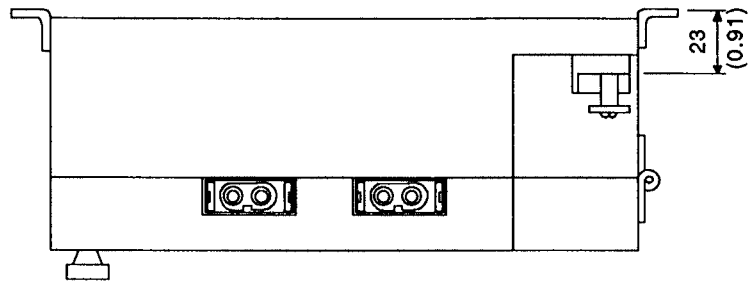
C type: Cable for outdoor connections.

D type: Cable for outdoor connections that have been reinforced.

There are special cables available for moveable applications and resistance to heat.

Contact your Mitsubishi Electric System & Service Co., Ltd.

APPENDIX 2 OUTSIDE DIMENSIONS



Unit: mm (inch)

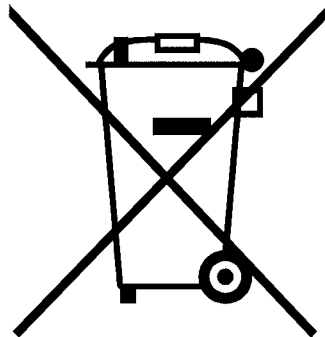
APPENDIX 3 Handling of Batteries and Devices with Built-in Batteries in EU Member States

This section describes the precautions for disposing of waste batteries in EU member states and exporting batteries and/or devices with built-in batteries to EU member states.

Appendix 3.1 Disposal precautions

In EU member states, there is a separate collection system for waste batteries. Dispose of batteries properly at the local community waste collection/recycling center.

The following symbol is printed on the batteries and packaging of batteries and devices with built-in batteries used for Mitsubishi programmable controllers.



Note: This symbol is for EU member states only.

The symbol is specified in the new EU Battery Directive (2006/66/EC) Article 20
"Information for end-users" and Annex II.

The symbol indicates that batteries need to be disposed of separately from other wastes.

Appendix 3.2 Exportation precautions

The new EU Battery Directive (2006/66/EC) requires the following when marketing or exporting batteries and/or devices with built-in batteries to EU member states.

- To print the symbol on batteries, devices, or their packaging
- To explain the symbol in the manuals of the products

(1) Labelling

To market or export batteries and/or devices with built-in batteries, which have no symbol, to EU member states on September 26, 2008 or later, print the symbol shown on the previous page on the batteries, devices, or their packaging.

(2) Explaining the symbol in the manuals

To export devices incorporating Mitsubishi programmable controller to EU member states on September 26, 2008 or later, provide the latest manuals that include the explanation of the symbol.

If no Mitsubishi manuals or any old manuals without the explanation of the symbol are provided, separately attach an explanatory note regarding the symbol to each manual of the devices.

POINT

The requirements apply to batteries and/or devices with built-in batteries manufactured before the enforcement date of the new EU Battery Directive (2006/66/EC).

WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

- (1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
- (2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
 1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure cause by the user's hardware or software design.
 2. Failure caused by unapproved modifications, etc., to the product by the user.
 3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if function or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
 4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
 5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
 6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi
 7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

- (1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
- (2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each F/Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

- (1) In using the Mitsubishi MELSEC programmable controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.
- (2) The Mitsubishi programmable controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or Public service purposes shall be excluded from the programmable controller applications.

In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable controller range of applications.

However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

Optic Bypass Switch Type A6BSW-P-S3(S4/S5/S6/S7)

User's Manual

MODEL	A6BSW-P-S3-U-E
MODEL CODE	13JE35
IB(NA)-66447-D(0809)MEE	



HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA, JAPAN

When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.