

## Chapter 7 Diagnosis function

### 7.1 Loop-back self diagnosis

Loop-back self diagnosis is a function which checks that computer link module operates normally by itself without connection to external devices and communication cable.

For loop-back self diagnosis, set operation mode switch to '8' Loop-back Test mode.

#### 7.1.1 Principle of operation

Loop-back test sends test data to computer link itself without external cable connection to RS-232C/RS-422 channels, receives the data, compares it with the sent data, and displays the result on LED.

Figure 7.1 shows data flow in Loop-back mode.

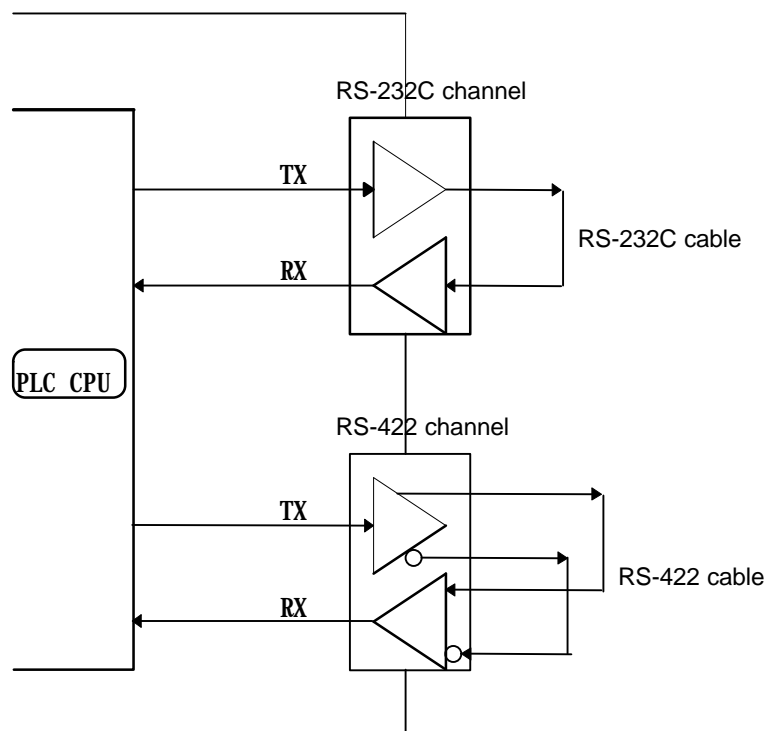


Figure 7.1 Data flow-chart in Loop-back mode

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### 7.1.2 procedure of Loop-back self diagnosis

Procedure of Loop-back self diagnosis is as follows :

- 1) Connect RS-232C/RS-422 channels like Figure 7.2 and 7.3.
- 2) Set operation mode setting switch to '8' Loop-back Test mode.
- 3) After starting self diagnosis by power on, verify normal or not with LED display.
- 4) When LED state is abnormal, see 9, Troubleshooting to take action.  
The self diagnosis will be repeated until power off

Figure 7.2 How to connect RS-232C cable

Computer link(9-Pin)		Connection No. and signal direction
Pin No.	Name	
1	CD	
2	RXD	
3	TXD	
4	DTR	
5	SG	
6	DSR	
7	RTS	
8	CTS	
9	RI	

Figure 7.3 How to connect RS-422 cable

Computer link(9-Pin)		How to connect cable
Pin No.	Name	
1	RDB	
2	RDA	
3	SDB	
4	SDA	
5	S.G	
6	F.G	

### 7.1.3 Operation of Loop-back test LED

Loop-back test changes and sends test data by itself, receives and compares the data, and displays the result on LED. LED state is divided into two states: the one that LED display switch of the front has been pushed ; the other that it has not been pushed.

#### 1) Operation contents indication(for LED switch not pushed)

Table 7.1 LED states depending on operation contents

LED#	Name	LED	Contents	LED	Contents
0	R	RUN	On	Off	Operating
1	S	TX	Flash	Off	Sending
2		RX	Flash	Off	Receiving
3	2	ACK	On	Off	ACK responding
4	3	NAK	On	Off	NAK responding
5	2	ERR	Flash	Off	Receive error occurrence
6	C	MODEM	On	Off	Modem mode setting
7		SYS-RUN	Flash	Off	Execution of CPU and I/F
8	R	RUN	On	Off	Operating
9	S	TX	Flash	Off	Sending
10		RX	Flash	Off	Receiving
11	4	ACK	On	Off	ACK responding
12	2	NAK	On	Off	NAK responding
13	2	ERR	Flash	Off	Receive error occurrence
14		RS-485	On	Off	Execution of RS-485
15		SYSTEM-ERR	On	Off	Abnormal communication module operation

#### <G6L-CUEB>

LED#	Name	LED	Contents	LED	Contents
0		RUN	On	Off	Operating
1		TX	Flash	Off	Sending
2		RX	Flash	Off	Receiving
3		ACK	On	Off	ACK responding
4		NAK	On	Off	NAK responding
5		COM-ERROR	Flash	Off	Receive error occurrence
6		MODEM	On	Off	Modem mode setting
7		SYS-RUN/ERR	Flash	Off	Execution of CPU and I/F

#### <G6L-CUEC>

LED#	Name	LED	Contents	LED	Contents
0		RUN	On	Off	Operating
1		TX	Flash	Off	Sending
2		RX	Flash	Off	Receiving
3		ACK	On	Off	ACK responding
4		NAK	On	Off	NAK responding
5		COM-ERROR	Flash	Off	Receive error occurrence
6		RS-485	On	Off	Execution of RS-485
7		SYS-RUN/ERR	Flash	Off	Abnormal communication module operation

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### 2) Tx/Rx data error indication(for LED display switch pushed – not applied to G6L-CUEB and G6L-CUEC)

If LED display switch is pushed, the data sent and received are compared, and if the data value are different, the counts are displayed. Data comparison for test checks in unit of frame whether computer link sends test data of 1 frame(128-Byte), the sent data is received, the received data is the same as the sent data. If they are different, it is displayed with error count increased.

If LED display switch is pushed during loop-back test, error count value can be checked according to RS-232C and RS-422 channels.

Table 7.2 Error count values when LED display switch pushed

RS-232C error count value(Hex)			RS-422 error count value(Hex)		
LED#	Bit value	Conversion method	LED#	Bit value	Conversion method
0	D0	Count values calculated by conversion of binary into hex regarding D0 as lower bit and D7 as upper bit.	8	D0	Count values calculated by conversion of binary into hex regarding D0 as lower bit and D7 as upper bit.
1	D1		9	D1	
2	D2		10	D2	
3	D3		11	D3	
4	D4		12	D4	
5	D5		13	D5	
6	D6		14	D6	
7	D7		15	D7	

#### Remark

- 1) When the result compared by the sent/received data has not any error, all LEDs become Off.
- 2) Transmission specifications for Tx/Rx of test data are defined by transmission specifications settings set by user, and for how to set transmission specifications, see 4.3.

## 7.2 Diagnosis when power on

Computer link module performs a diagnosis via self hardware check and PLC CPU/interface check during power on. The sequence is as follows :

Table 7.3 Checking sequence during power on

Checking sequence	Checking item	LED lighting sequence
1	Self memory check	LED '0' On
2	Flash memory check	LED '1' On
3	NS-16550 chip check	LED '2' On
4	Common memory check	LED '3' On
5	PLC interface check	LED '4' On
6	Operation mode check	LED '5' On

When self diagnosis and PLC CPU interface check are normal, LEDs from '0' to '5' lights in sequence, after that 232-RUN LED and 422-RUN LED become 'On', and 'RUN' LED becomes 'On', and then normal operation starts.

If after power on, error occurs during self diagnosis, SYS-ERR LED blinks, and the LED of error occurrence item is maintained in state of 'On'.

For example, if there is common memory error, LEDs from '0' to '3' lights in sequence, after that common memory error LED of '4' lights, and then SYS-ERR LED flashes.

In above method, user can detect the error in hardware, and if it is hardware error, contact our company's Service station.

### Remark

In check sequence of self diagnosis during power on, when the operation of sequence 6, [Operation mode check], LED 5 becomes On-Off momentarily, so in visual On-Off identification may be impossible, but it is not failure.



# Chapter 8 Installation and Testing Operation

## 8.1 Installation and Testing Operation of Cnet module

Cnet communication module has different mounting Max. units depending on PLC CPU unit type. Mounting units depending on CPU unit type are as follows :

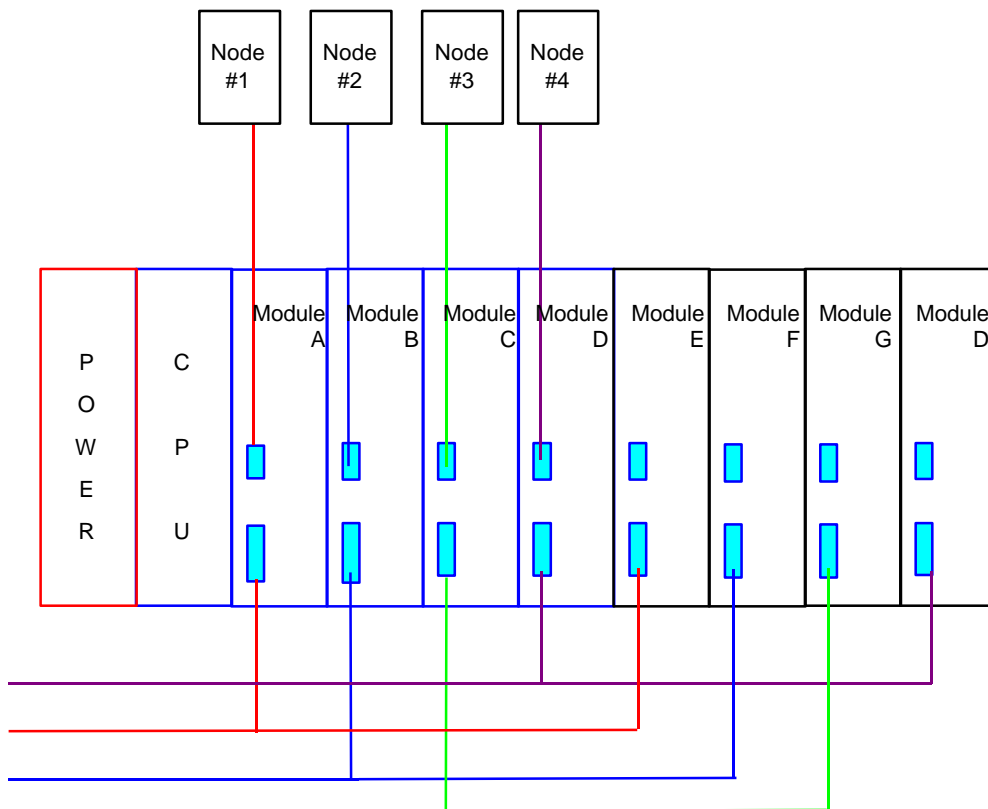
Table 8.1 Number of mounting units of Cnet communication module according to CPU type

CPU type	Max. units	Mounting position	Remark
GM1, GM2, GM3	8	I/O slot of main base	
GM4	2	I/O slot of main base	
GM6	2	I/O slot of main base	

### 8.1.1 Mounting and installation of Cnet module

GM1, GM2, or GM3 PLC unit has up to 8 units communication module mounted. Figure 8.1 shows the example of mounting. But, it can be mounted on the main base only.

Figure 8.1 Example of mounting in GM1,2,3





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For GM4,GM6 PLC, the main base has up to 2 units communication module mounted. But, it can not be mounted on extension base.

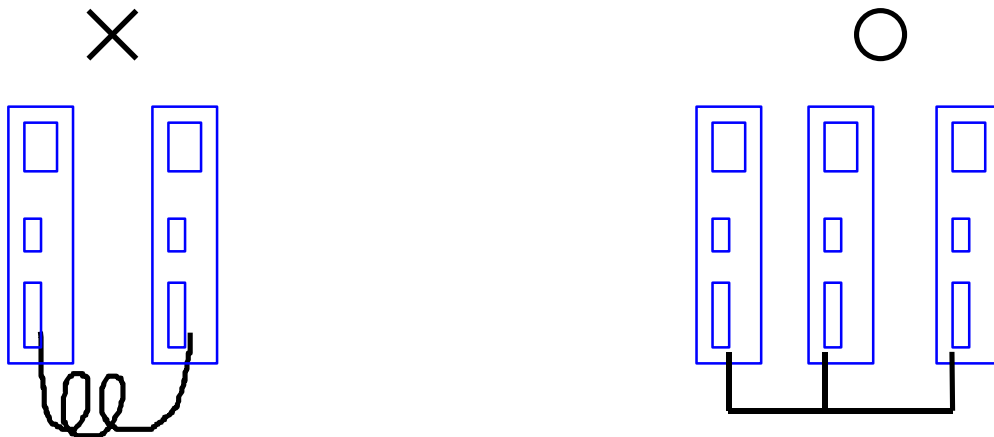
The procedure is as follows :

- 1) Prepare the basic system configuration required for system configuration.
- 2) To mount this communication module, work it at the state of power off in PLC.
- 3) Verify whether the connector of base in which module is to be mounted has any foreign substance during mounting this communication module, and that connector pin of this module has been damaged.
- 4) Communication module can not be mounted on extension base, but main base, of which slot position must be selected closely to CPU.
- 5) Mounting units must be 8 units and less(according to CPU type) during configuration.
- 6) With communication cable not connected, correctly insert the projected part of module bottom into groove of base board. After that apply enough force to lock the upper part to the locking device of base board. If the locking device is not tightly locked, CPU and interface may have abnormal conditions.
- 7) By using switch of the front of communication module, set to operation mode to be used. For operation mode description, see general specifications.
- 8) For cable connection of electric module, screw it in order to be tightly connected by using locking screw of cable connector.
- 9) Power on after connection of communication cable, observe the LED operation states, and verify its operation is normal or not. If it is normal, download and carry out frame and program via frame editor definition and GMWIN.(User defined mode)



### 8.1.2 Cautions during system installation

- 1) Correctly select which operation mode may be used by user for Cnet communication module, and set the operation mode according to it. If the operation mode is not correctly set, failure may occur. Pay attention to this point.
- 2) Including this module, setting station No. of all stations must be different. If, in state of dedicated communication mode set, the station No. is repeated, the communication may have failure, and cannot have normal communication.
- 3) For communication cable, use cable of specified specifications. If not so, serious communication failure may occur.
- 4) Inspect whether communication cable is cut off or shorted before installation.
- 5) Tightly screw communication cable connector to secure the cable connection. If cable connection is unstable, communication may have serious failure.
- 6) RS-422/485 cable connection must be correctly connected for TX/RX. If various stations have been connected, for between the initial two stations TX and RX must be connected, and for the other stations TX and TX, RX and RX each must be connected. (RS-422 communication)  
For RS-485 communication, TX and RX must be connected. For the details, see 3.5, chapter 4.
- 7) If communication cable is twisted as below or not normally connected, communication error may occur.

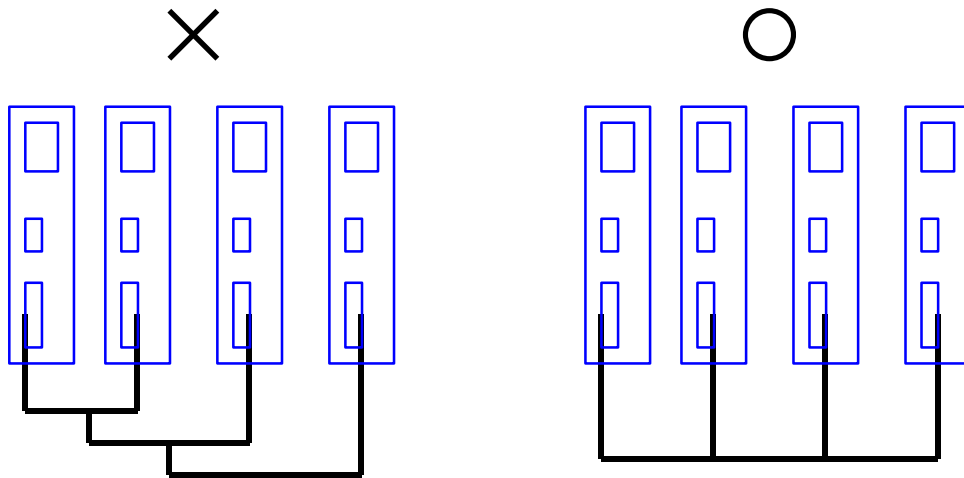




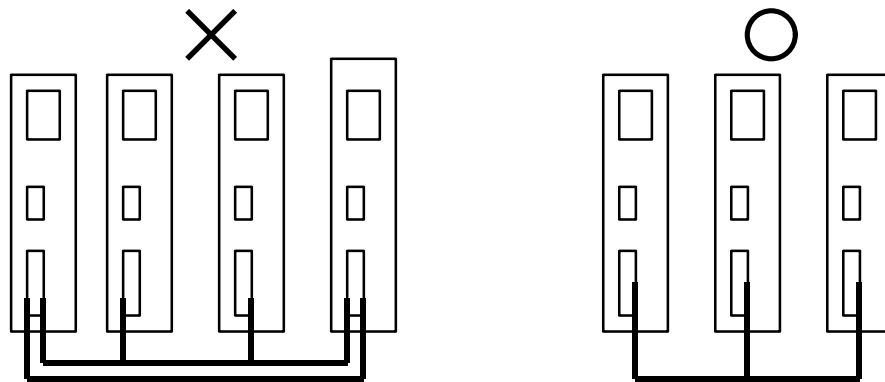
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- 8) Cable bifurcation is not allowable.



- 9) Network connected by communication cable must be connected in order not to be closed-circuit.



- 10) When long distance of communication cable is required, wire the cable in order to be apart from power line or inductive noise.
- 11) If LED operation is abnormal, see chapter 9, troubleshooting in this manual to verify abnormal cause. When problems occur continuously even if measuring, contact Service station.



**8.1.3 Testing Operation**

**1) Preparations until Testing Operation start**

This describes the preparations to be confirmed before Testing Operation communication module

Table 8.2 Preparations for Testing Operation

<b>Preparation</b>	<b>Contents</b>
Check for base module mounting	<ul style="list-style-type: none"> <li>- Does the power module fit to power module specifications?</li> <li>- Is the battery of CPU module connected?</li> <li>- Is the mounting of the entire base module good?</li> <li>    ☞ See user's manual according to each PLC type.</li> </ul>
Communication cable connection (for cable connected only)	<ul style="list-style-type: none"> <li>- Is the connection state of communication cable good?</li> <li>- Is the connection of each cable open loop type?</li> <li>    ☞ See Cautions during system configuration of 8.1.2</li> </ul>
Module mounting	<ul style="list-style-type: none"> <li>- Is the mounting state of communication module mounted in main base good?</li> <li>    ☞ See Mounting and installation of 8.1.1</li> </ul>
Switch check	<ul style="list-style-type: none"> <li>- Is the setting of mode switch correct?</li> <li>- Is the setting of frame definition correct?</li> </ul>

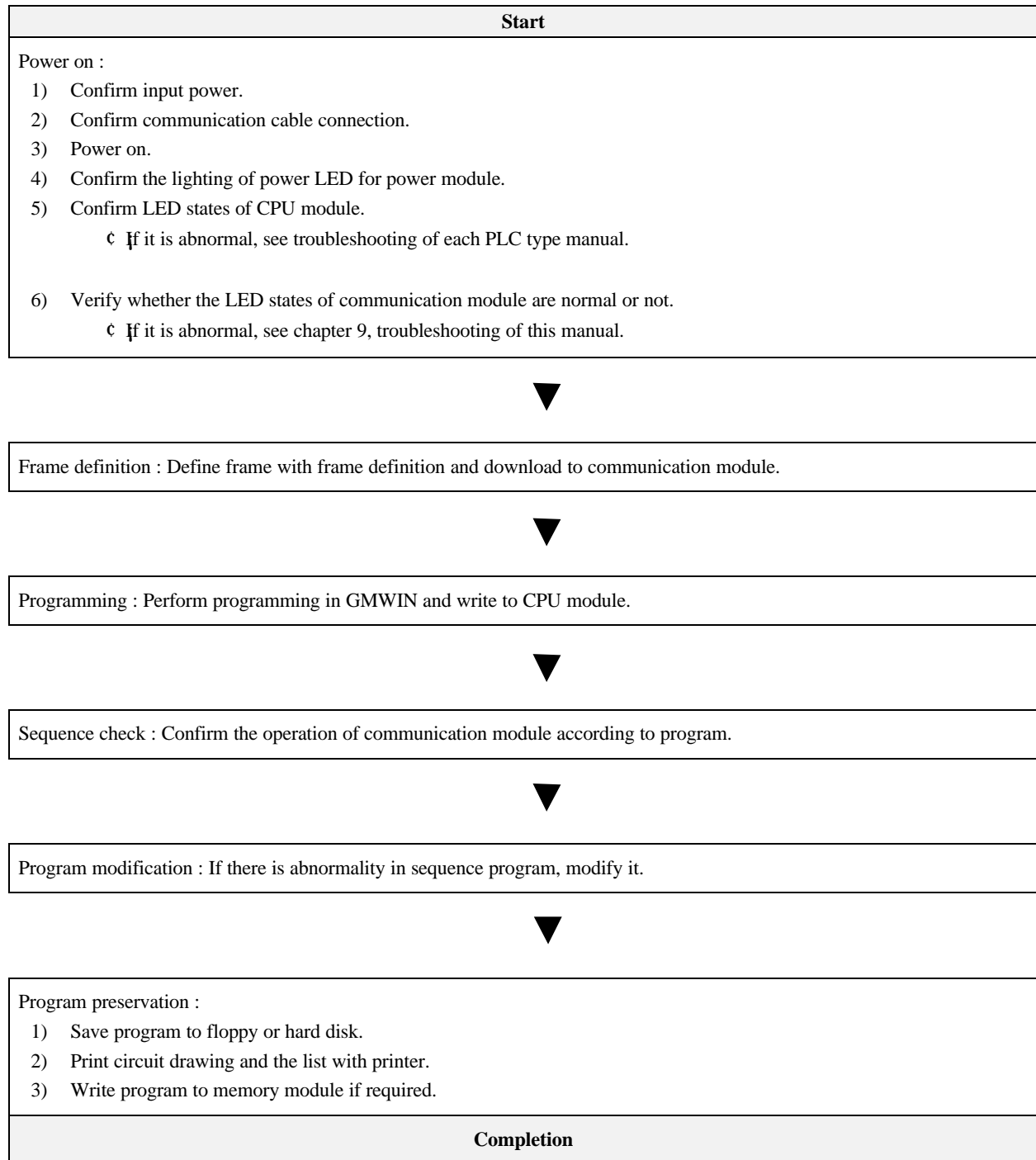


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### 2) Sequence of Testing Operation

This shows the sequence from PLC installation completion to Testing Operation.





## 8.2 Maintenance and check

### 8.2.1 Daily check

Routine checks are as follows :

Table 8.3 Routine checking items

Checking item		Contents to be checked	Criteria of decision	Action to take
Cable connection state		Cable loosened	Shall not be loosened	Tighten the cable
Module connection state		Module tightening screw loosened	Shall not be loosened	Tighten module screw
Indication LED	System operation LED(7:SYS-RUN)	Flash checked	Flash(light off is abnormal) -of CPU and interface	See Appendix A1.
	Channel operation LED (0:RS-232C RUN 8:RS-422/485 RUN)	Light On checked	Only if channel active LED lights, data is normally sent/received (If light off, communication is disconnected.)	See Appendix A1.
	Communication error LED (5:RS-232C ERR 13:RS-422/485 ERR)	Light Off checked	Flash is abnormal (abnormal parameter setting or cable failure)	See Appendix A1.
	TX/RX LED (1/2 RS-232C TX/RX 9/10:RS-422/485 TX/RX)	Flash checked	Light off is abnormal (abnormal hardware of module)	See Appendix A1.
	System error LED (15:SYS-ERROR)	Light Off checked	If flash, it means system is ab-normal.	See Appendix A1.



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### 8.2.2 Regular check

Check the below items by 1-2 times per six months to take actions required as shown in the following Table.

Table 8.4 Regular check items

Check item		How to check	Criteria of decision	Action to take
Ambient conditions	Ambient temp.		0-55 $\pm$ É	Adjust it in order to fit to general specifications (for use in panel, inside panel ambient criteria)
	Ambient moisture	Measure thermometer/hygrometer	5-95% RH	
	Ambient pollution	Measure corrosive gas	Corrosive gas shall not be there.	
Module state	Loosening, Shaking	Move communication module	It shall be tightly mount-ed.	Tighten screw
	Dust, Foreign matters	Visual inspection	No dust or foreign matters shall be there.	
Connection state	Terminal screw loosened	Tighten with driver	No loosening shall be there.	Tighten
	Closeness of compressed terminal	Visual inspection	Distance shall be suit-able.	Correct
	Connector loosening	Visual inspection	No loosening shall be there.	Tighten connector locking screw.
Power voltage check		AC 110/220V Measure voltage between terminals	AC 85-132V AC 170-264V	Modify power supply. Modify transformer tap.