Chapter 11 TROUBLESHOOTING

The following explains contents, diagnosis and corrective actions for various errors that can occur during system operation.

11.1 Basic Procedures of Troubleshooting

System reliability not only depends on reliable equipment but also on short downtimes in the event of faults. The short discovery and corrective action is needed for speedy operation of system. The following shows the basic instructions for troubleshooting.

1) Visual checks

Check the following points.

- Machine operating condition (in stop and operating status)
- Power On/Off
- Status of I/O devices
- Condition of wiring (I/O wires, extension and communications cables)
- Display states of various indicators (such as POWER LED, RUN LED, ERR. LED and I/O LED). After checking them, connect peripheral devices and check the operation status of the PLC and the program contents.

2) Trouble Check

Observe any change in the error conditions during the following.

- Switch to the STOP position, and then turn the power on and off.

3) Narrow down the possible causes of the trouble where the fault lies, i.e.:

- Inside or outside of the PLC?
- I/O module or another module?
- PLC program?

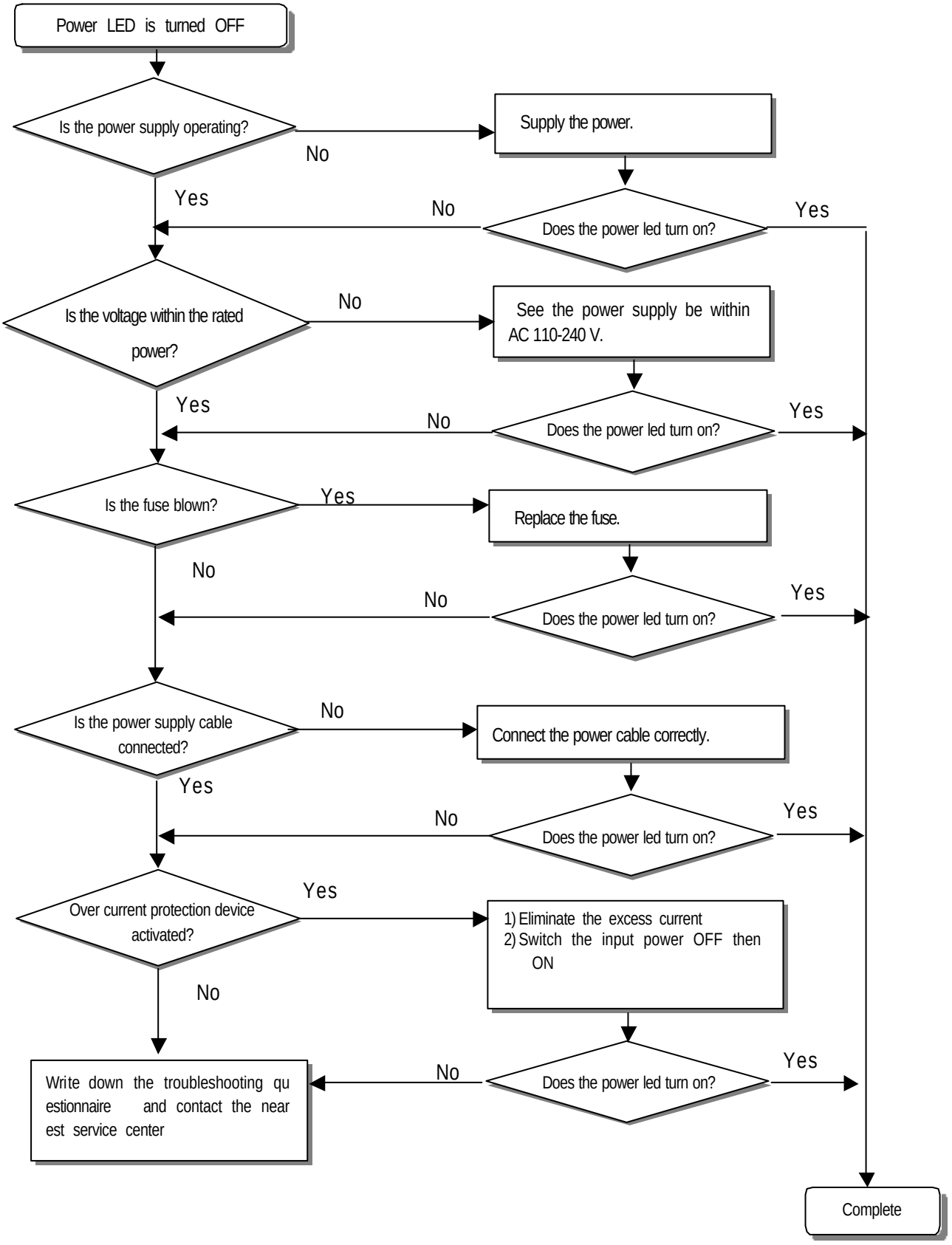
11.2 Troubleshooting

This section explains the procedure for determining the cause of troubles as well as the errors and corrective actions.

Is the power LED turned OFF?	⇨	Flowchart used when the POWER LED is turned OFF
Is the ERR LED flickering?	⇨	Flowchart used when the ERR LED is flickering
Are the RUN LED turned OFF?	⇨	Flowchart used when the RUN turned OFF.
I/O module doesn't operate properly	⇨	Flowchart used when the output load of the output module doesn't turn on.
Program cannot be written	⇨	Flowchart used when a program can't be written to the PLC

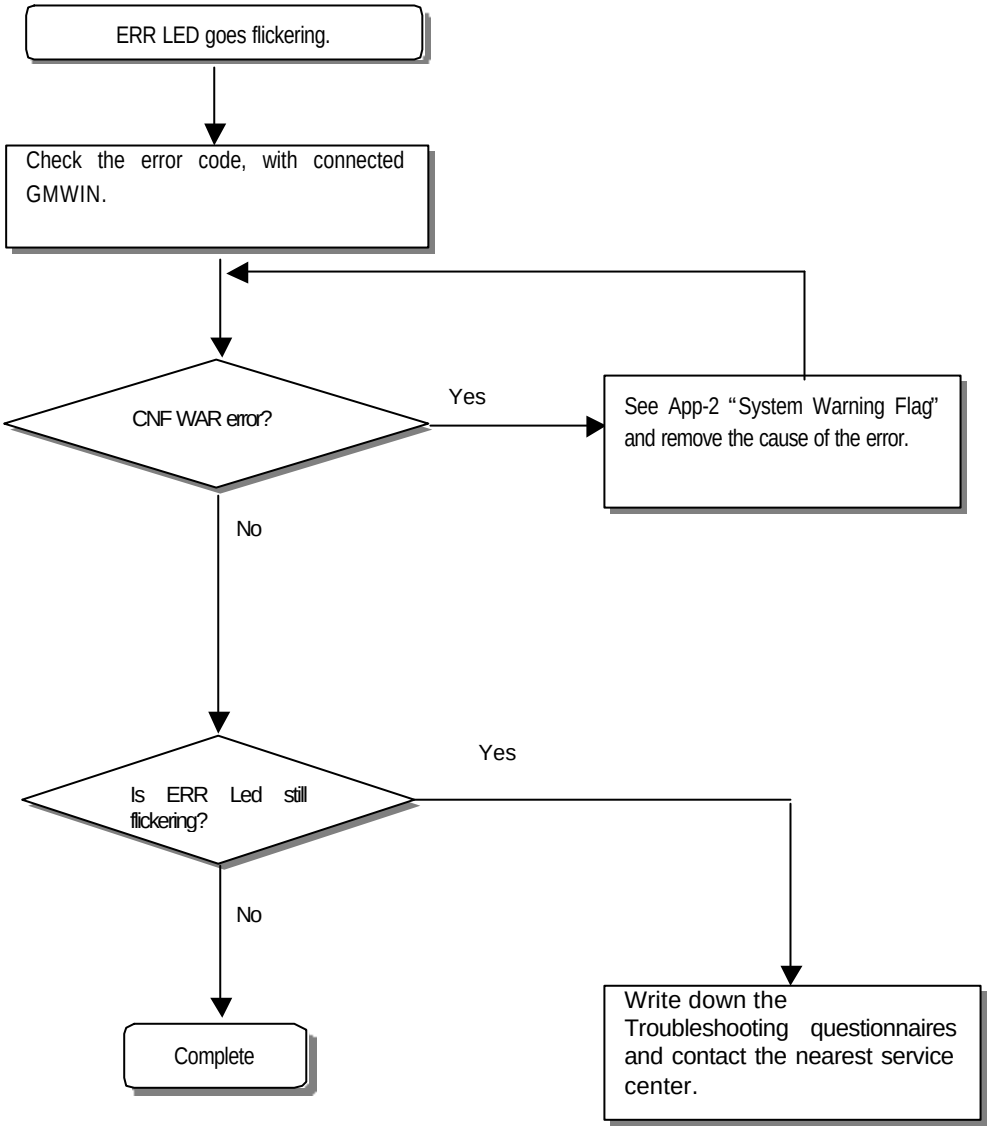
11.2.1 Troubleshooting flowchart used when the POWER LED turns OFF.

The following flowchart explains corrective action procedure used when the power is supplied or the power led turns off during operation.



11.2.2 Troubleshooting flowchart used when the ERR LED is flickering

The following flowchart explains corrective action procedure use when the power is supplied starts or the ERR LED is flickering during operation.

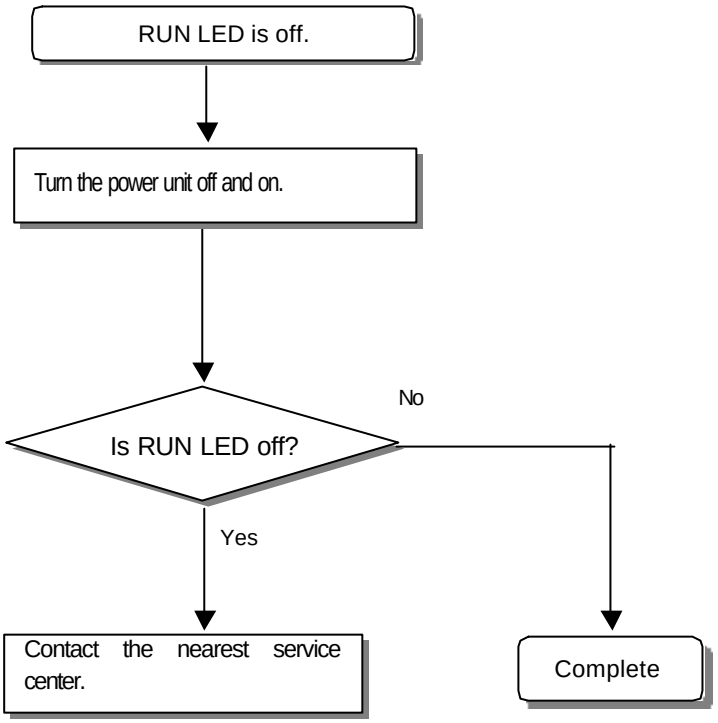


REMARK

Though CNF WAR appears, PLC system doesn't stop but corrective action is needed promptly. If not, it may cause the system failure.

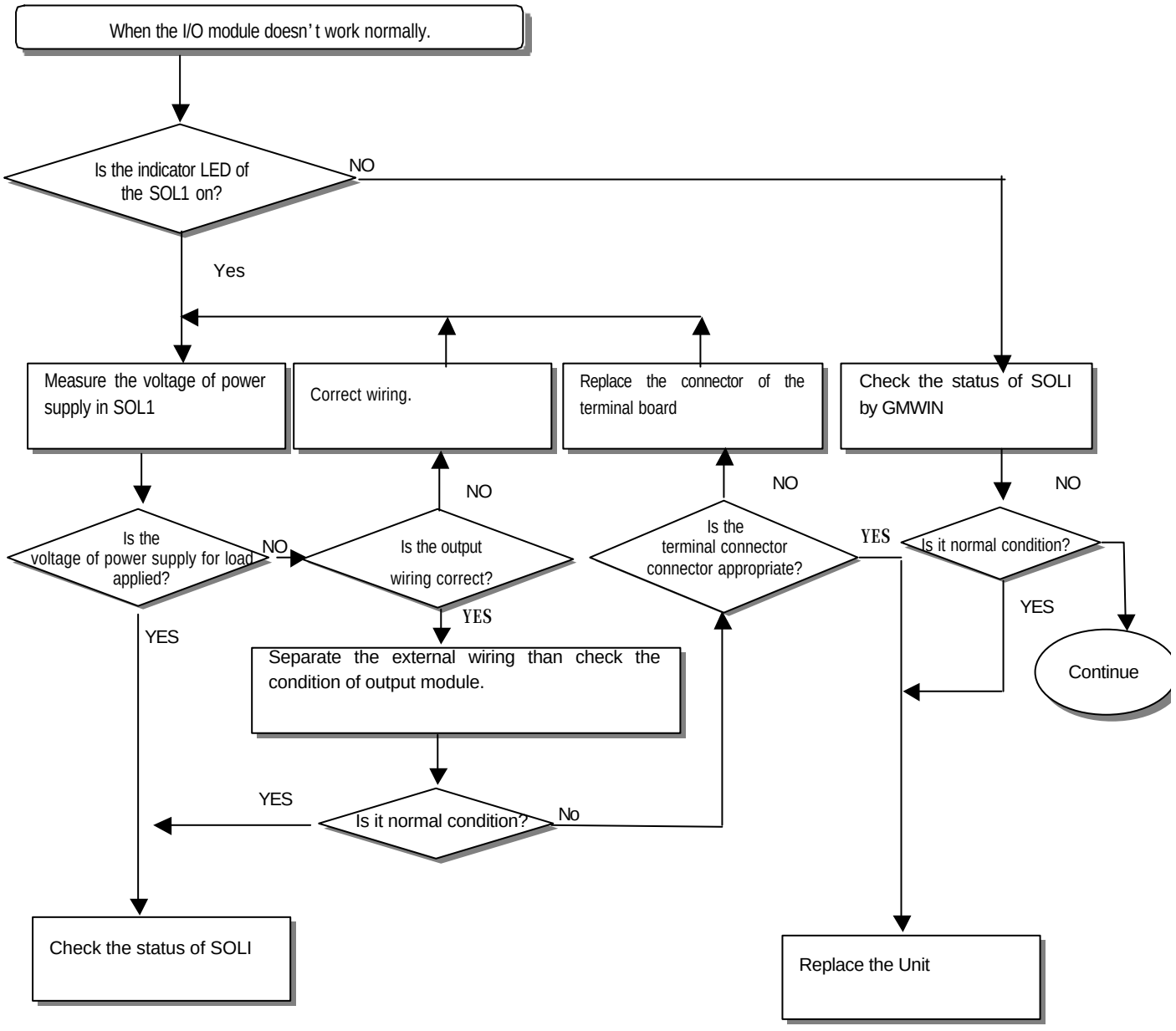
11.2.3 Troubleshooting flowchart used when the RUN turns off.

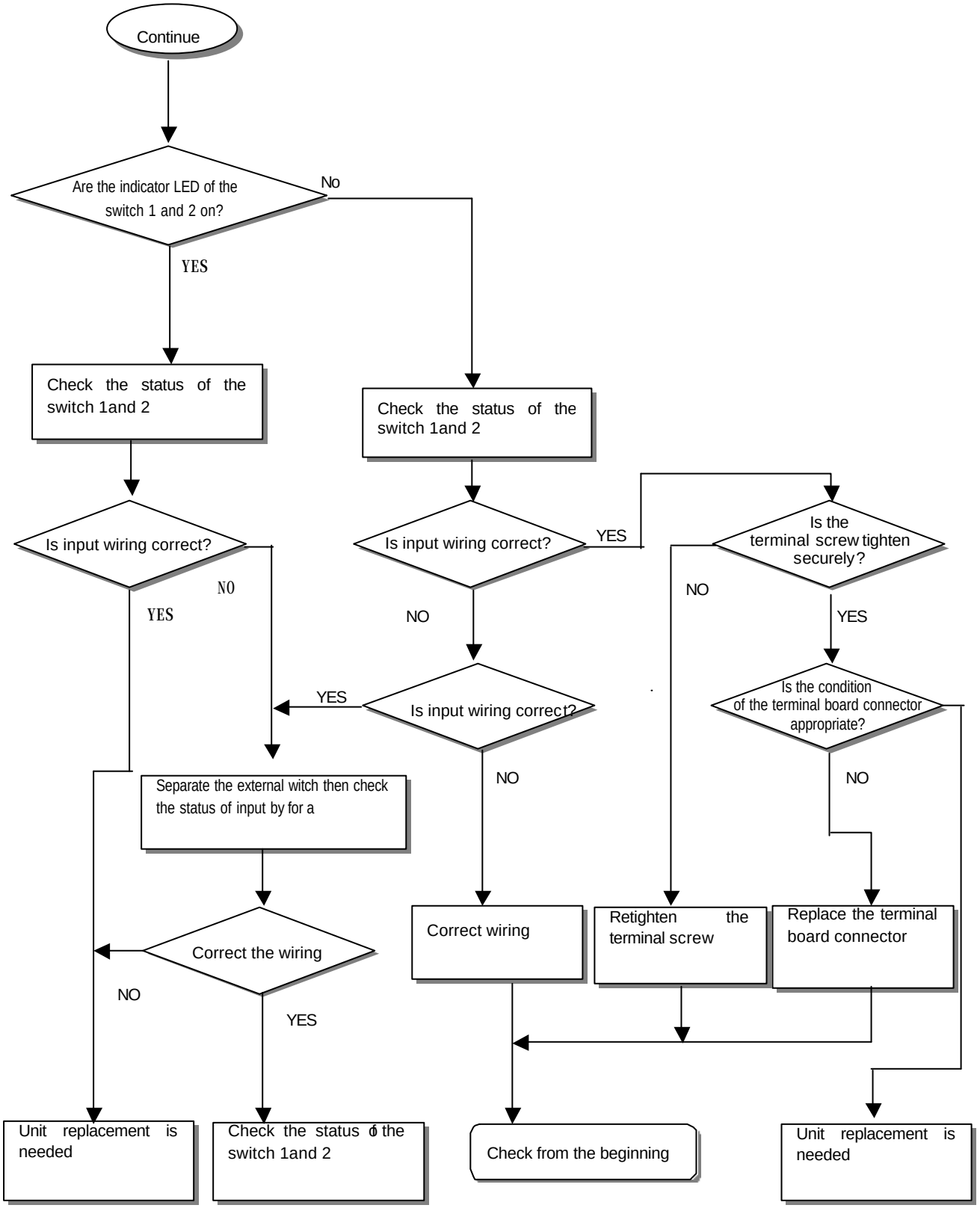
The following flowchart explains corrective action procedure to treat the lights-out of RUN LED when the power is supplied, operation starts or operation is in the process.



11.2.4 Troubleshooting flowchart used when the I/O part doesn't operate normally.

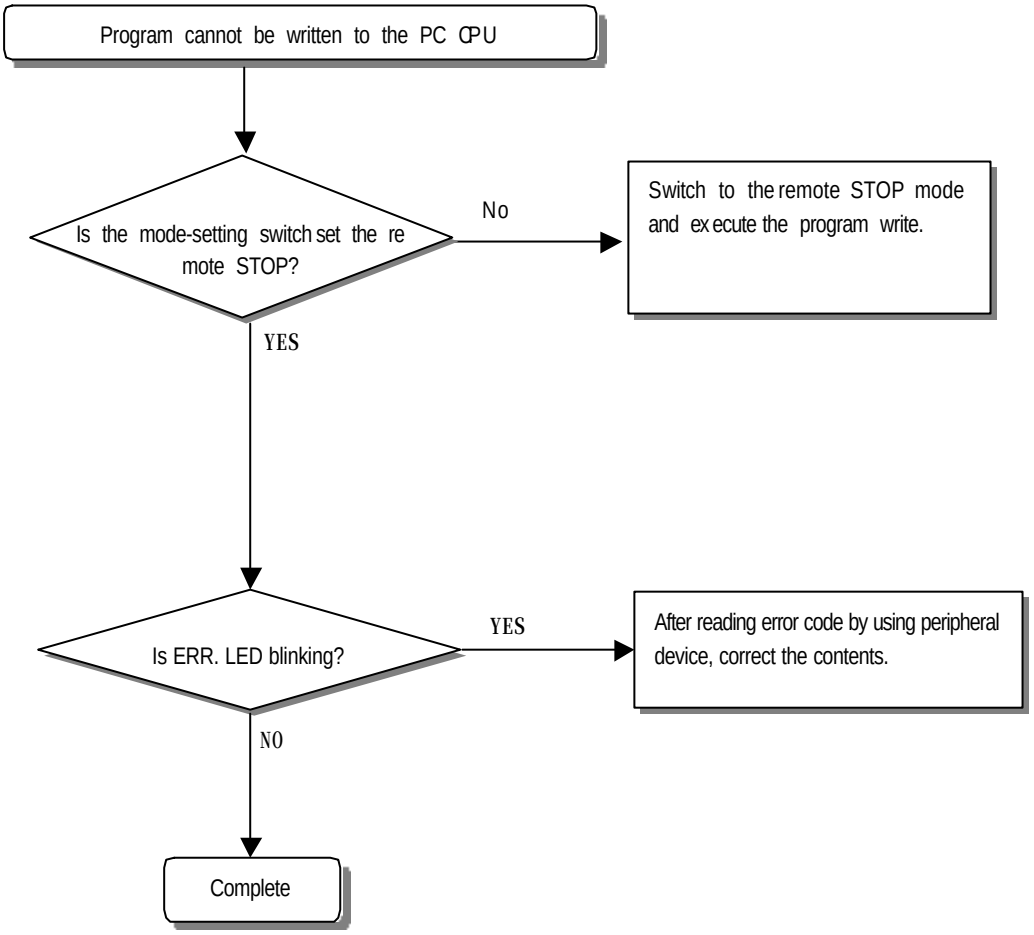
The following flowchart explains corrective action procedure used when the I/O module doesn't operate normally.




Continue
Are the indicator LED of the switch 1 and 2 on?
No
YES
Check the status of the switch 1and 2
Check the status of the switch 1and 2
Is input wiring correct?
NO
YES
Is input wiring correct?
YES
NO
Is the terminal screw tighten securely?
NO
YES
YES
Is input wiring correct?
Is the condition of the terminal board connector appropriate?
NO
NO
Separate the external witch then check the status of input by for a
Correct the wiring
NO
YES
Correct wiring
Retighten the terminal screw
Replace the terminal board connector
Unit replacement is needed
Check the status of the switch 1and 2
Check from the beginning
Unit replacement is needed

11.2.5 Troubleshooting flowchart used when a program cannot be written to the CPU part

The following flowchart shows the corrective action procedure used when a program cannot be written to the PLC module.



11.3 Troubleshooting Questionnaire

When problems have been met during operation of the GM7 series, please write down this Questionnaires and contact the service center via telephone or facsimile.

• For errors relating to special or communication modules, use the questionnaire included in the User's manual of the unit.

Telephone & FAX No
Tell)
FAX)
Using equipment model:
Details of using equipment
CPU model:
OS version No.( ),
Serial No.( )
GMWIN version No. used to compile programs: ( )
General description of the device or system used as the control object

5. The kind of the base unit:
– Operation by the mode setting switch ( ),
– Operation by the GMWIN or communications ( ),
– External memory module operation ( ),

6. Is the ERR. LED of the CPU module turned ON? Yes( ), No( )

7. GMWIN error message:

8. Used initialization program: initialization program ( )

9. History of corrective actions for the error message in the article 7:

10. Other tried corrective actions:

11. Characteristics of the error
• Repetitive(**):** Periodic( ), Related to a particular sequence( ), Related to environment( )
• Sometimes(**)**: General error interval:

12. Detailed Description of error contents:

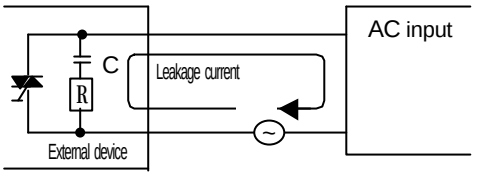
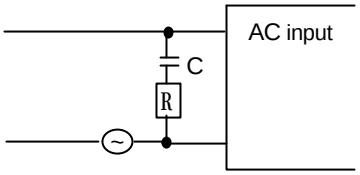
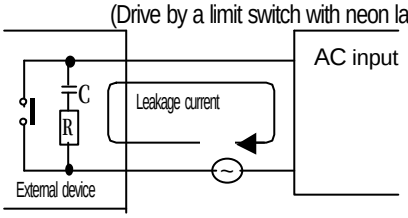
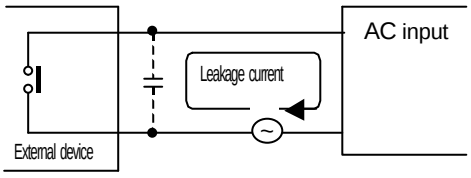
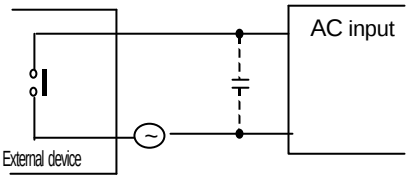
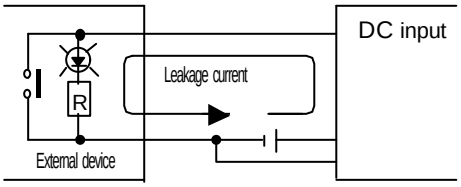
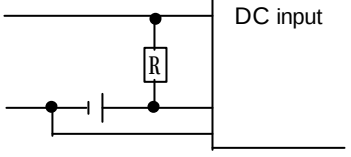
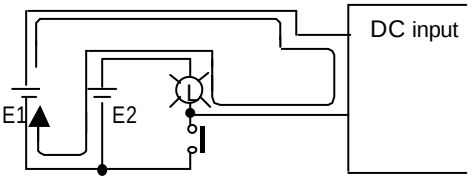
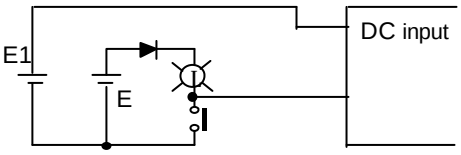
13. Configuration diagram for the applied system:

11.4 Troubleshooting Examples

Possible troubles with various circuits and their corrective actions are explained.

11.4.1 Input circuit troubles and corrective actions

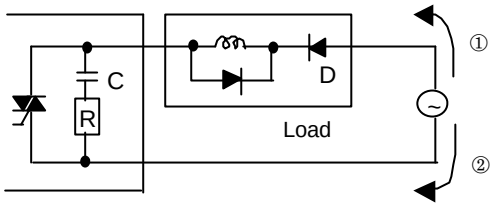
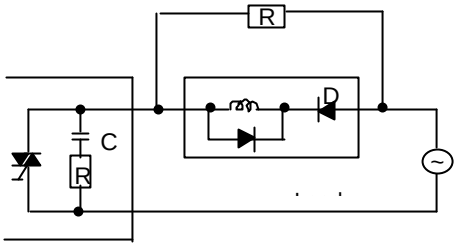
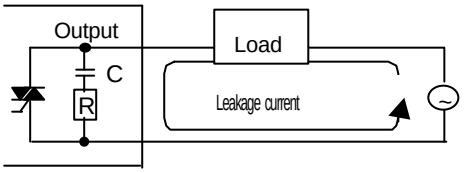
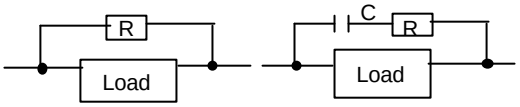
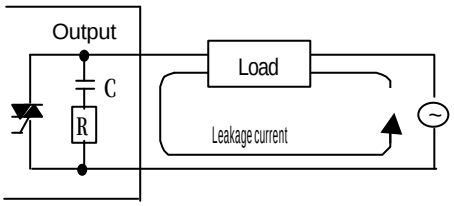
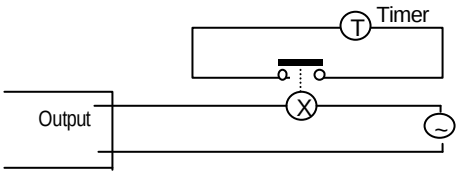
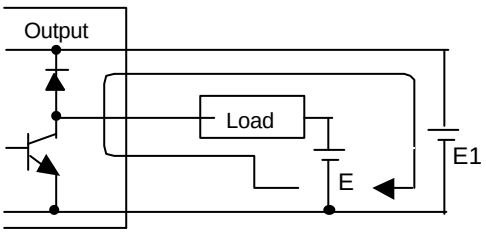
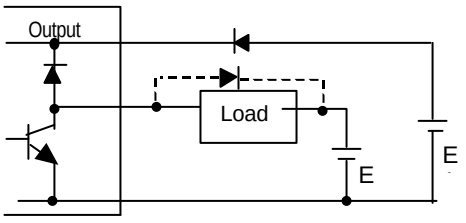
The followings describe possible troubles with input circuits, as well as corrective actions.

<table>
<tr><th>Condition</th><th>Cause</th><th>Corrective Actions</th></tr>
<tr><td>Input signal doesn't turn off.</td><td>Leakage current of external device
(Such as a drive by non-contact switch)
 
</td><td>• Connect an appropriate register and capacity, which will make the voltage lower across the terminals of the input module.
 
</td></tr>
<tr><td>Input signal doesn't turn off.
(Neon lamp may be still on)</td><td>Leakage current of external device
(Drive by a limit switch with neon lamp)
 
</td><td>• CR values are determined by the leakage current value.
– Recommended value C : 0.1 ~ 0.47 μF
R: 47 ~ 120 Ω (1/2W)
Or make up another independent display circuit.</td></tr>
<tr><td>Input signal doesn't turn off.</td><td>Leakage current due to line capacity of wiring cable.
 
</td><td>• Locate the power supply on the external device side as shown below.
 
</td></tr>
<tr><td>Input signal doesn't turn off.</td><td>Leakage current of external device
(Drive by switch with LED indicator)
 
</td><td>• Connect an appropriate register, which will make the voltage higher than the OFF voltage across the input module terminal and common terminal.
 
</td></tr>
<tr><td>Input signal doesn't turn off.</td><td>• Sneak current due to the use of two different power supplies.
 
</td><td>• Use only one power supply.
• Connect a sneak current prevention diode.
 
</td></tr>
</table>

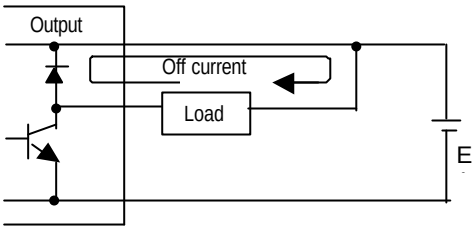
	• E1 > E2, sneaked.	

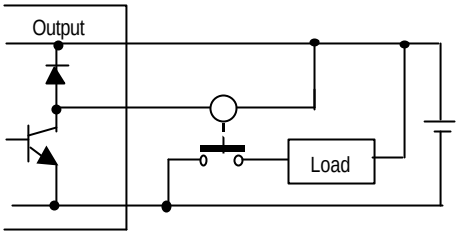
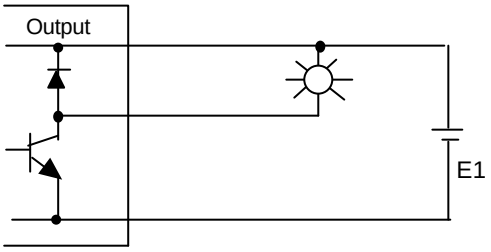
11.4.2 Output circuit troubles and corrective actions

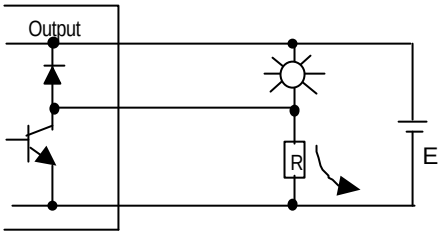
The following describes possible troubles with input circuits, as well as their corrective actions.

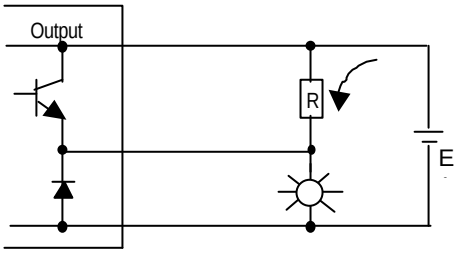
Condition	Cause	Corrective Action
When the output is off, excessive voltage is applied to the load.	•Load is half-wave rectified inside (in some cases, it is true of a solenoid) •When the polarity of the power supply is as shown in ①, C is charged. When the polarity is as shown in ②, the voltage charged in C plus the line voltage are applied across D. Max. voltage is approx. $2\sqrt{2}$.  *) If a resistor is used in this way, it does not pose a problem to the output element. But it may make the performance of the diode (D), which is built in the load, drop to cause problems.	• Connect registers of tens to hundreds KΩ across the load in parallel. 
The load doesn't turn off.	• Leakage current by surge absorbing circuit, which is connected to output element in parallel. 	• Connect C and R across the load, which are of registers of tens KΩ. When the wiring distance from the output module to the load is long, there may be a leakage current due to the line capacity. 
When the load is C-R type timer, time constant fluctuates.	• Leakage current by surge absorbing circuit, which is connected to output element in parallel. 	• Drive the relay using a contact and drive the C-R type timer using the since contact. • Use other timer than the C–R contact some timers have half-ware rectified internal circuits therefore, be cautious. 
The load does not turn off.	• Sneak current due to the use of two different power supplies.  E1<E2, sneaks. E1 is off (E2 is on), sneaks.	• Use only one power supply. • Connect a sneak current prevention diode.  If the load is the relay, etc, connect a counter-electromotive voltage absorbing code as shown by the dot line.

Output circuit troubles and corrective actions (continued).

<table>
<tr><th>Condition</th><th>Cause</th><th>Corrective actions</th></tr>
<tr><td>The load off response time is long.</td><td>• Over current at off state [The large solenoid current fluidic load (L/R is large) such as is directly driven with the transistor output.
 

• The off response time can be delay ed by one or more second as some loads make the current flow across the diode at the off time of the transistor output.</td><td>• Insert a small L/R magnetic contact and drive the load using the same contact.
 
</td></tr>
<tr><td>Output transistor is destroyed.</td><td>Surge current of the white lamp
 

A surge current of 10 times or more when turned on.</td><td>• To suppress the surge current make the dark current of 1/3 to 1/5 rated current flow.
 

Sink type transistor output
 

Source type transistor output</td></tr>
</table>

11.5 Error code list

Error	Cause	Corrective action	Operation status	ERR. LED flickering cycle	Diagnosis time	Restart mode
2	OS ROM error	Contact the A/S center if it reactively occurs when the power is re-applied.	Defect	0.4 sec.	When power is applied.	–
3	OS RAM error	Contact the A/S center if it reactively occurs when the power is re-applied.	Defect	0.4 sec.	When power is applied.	–
4	IC (RTC) error	Contact the A/S center if it reactively occurs when the power is re-applied.	Defect	0.4 sec.	When power is applied.	–
5	Fault processor	Contact the A/S center if it reactively occurs when the power is re-applied.	Defect	0.4 sec.	When power is applied.	–
6	Program memory fault	Contact the A/S center if it reactively occurs when the power is re-applied.	Defect	0.4 sec.	When power is applied.	–
7	Data memory fault	Contact the A/S center if it reactively occurs when the power is re-applied.	Defect	0.4 sec.	When power is applied.	–
10	Watch dog error due to RE-apply the power	Re-apply the power	Reset	–	During run	Cold
20	Program Memory backup error	Replace the battery if it has error check the program after cc-loading it, and if an error is detected replace the CPU module.	STOP	0.4 sec.	When power is applied.	Cold
22	Memory module program fault	Correct the memory module program and re-operate the system.	STOP	0.4 sec.	Change into the RUN mode	Cold
23	An normal program	Re-load the program and start it	STOP	0.4 sec.	Change into the RUN mode	Cold
30	Inconsistency between the specified modules by parameters and the loaded modules	Module type inconsistency error Refer to the flags (_IO_TYER, IO_TYER_N, IO_TYER [n]) and correct the in corrective slot, and restart the system.	STOP	0.4 sec.	Change into the RUN mode	Cold
31	Module dismounting or additional mounting during run	Module mounting/ dismounting error Refer to the flags (_IO_DEER, _IO_DEER_N, _IO_DEER [n]) and correct the in corrective slot, and restart the system.	STOP	0.4 sec.	When scan completes	Cold
32	Fuse disconnection during run	Fuse disconnection error Refer to the flags (_FUSE_ER, FUSE_ER_N, FUSE_ER [n]) and correct the in corrective slot, and restart the system.	STOP	0.4 sec.	When scan completes	Cold
33	Abnormal I/D module data access during run	I/O module read/write error Refer to the flags (_SP_IFER, _IP_IFER_N, _IP_IFER [n]) and restart the system.	STOP	0.4 sec.	When scan completes During execution of program	Cold

Error	Cause	Corrective action	Operation status	ERR. LED Flickering cycle	Diagnosis time	Restart mode
34	Abnormal special link module data access during run	Special/link module interface error Refer to the flags (_SP_IFER, _IP_IFER_N, _IP_IFER [n]) and restart the system.	STOP	0.4 sec.	When power is applied. When scan completes During execution of program	Cold
40	During run, Scan time over than the scan delay time specified by parameters	Check the scan delay time specified by parameters and correct the parameters or the program, and then restart the program.	STOP	0.4 sec.	During execution of program	Cold
41	Unreadable instructions in the user program.	Re-load the program and restart it.	STOP	0.4 sec.	During execution of program	Cold
50	External device fatal error.	Refer to the external device fatal error. Flag (ANNUN_ER, _ANC_ERR [n]) and correct the fault devices and then restart the system.	STOP	0.4 sec.	When scan completes	Cold
60	The 'E_STOP' function has been executed.	Correct the program so that the error elements that invoked the 'E_STOP' function can be eliminated in the program and restart the system (cold restart).	STOP	–	During execution of program	–
100	Communications module configuration error	If the number of computer 4 communications module is included, then adjust the maximum number with in 8.	STOP	0.4 sec.	When power is applied.	Cold
101	Special/ Communications module initialization failure	Adjust the number of high-speed communications modules loaded.	STOP	0.4 sec.	When power is applied.	Cold
500	Data memory backup error	If the batter has no error.	RUN	–	When power is applied. When scan completes	Cold
501	RTC data error	If the battery has no error, reset the time using the SMWIN.	RUN	2 sec.	When power is applied. When scan completes	–
502	Lower battery voltage	Replace the battery, which the power is being applied.	RUN	4 sec.	When power is applied. When scan completes	–