

# **K-06a**

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## **ELECTRICIAN TRAINING**

### **SKILL DEVELOPMENT GUIDE**

**PLC (Allen-Bradley)**

**K-06a: Troubleshoot I/O Module**

**Issued 01/01/98**



## Task Preview

### Troubleshoot I/O Module

This troubleshooting task covers both Discrete and Intelligent I/O modules. The first step in troubleshooting is to try to isolate the problem by determining where the machine is in the machine cycle. If you have a Discrete I/O module, you need to check the Ladder Diagram's inputs and outputs against the module's indicators. If the Ladder Diagram input is false and the corresponding indicator on the input card is illuminated, the module is probably faulty. Troubleshooting an Intelligent I/O module involves checking the status indicators, STATUS word, and BLOCK WRITE to determine if the module is functioning properly.

### How your skills will be checked

The Skill Check will require you to troubleshoot an I/O module. All tools, materials, and resources will be available. The Evaluator will verify that your demonstration meets the skill objective by observing or measuring each task standard. You must demonstrate safe work practices during the Skill Check. Contact your Evaluator whenever you are ready for the Skill Check.



## **Skill Objective**

If the I/O module's status lights indicate an abnormal condition or if a "FAULTED" message is displayed, troubleshoot the I/O module.

### **Task Standards**

1. You identify the I/O module problem.
2. You recommend the appropriate corrective action.

## What You Will Need

This section contains the safety information, tools, and resources you will need before troubleshooting an I/O module.



- Follow all Caterpillar Facility Safety Standards when performing this task in the plant.
- Use caution when working around the PLC; high voltage is present on the inside of the PLC cabinet door and near the input/output (I/O) chassis.
- Be careful when working near moving or rotating machinery.
- Wear safety glasses and hearing protection in assembly and production areas.



- PC equipped with PLC software
- PLC
- Interconnect cable
- Digital Voltmeter (to check the I/O module or device performance)
- Oscilloscope (to check the I/O module or device performance)
- Basic electrical hand tools
- Processor Keyswitch Key (if the processor is not in the REM position)
- Password (if necessary)



- Electrical Schematics
- Ladder Diagram printout
- User's Manual for I/O Module



## Task Steps

### Troubleshoot I/O Module

1. **Ask the Operator for information about where the machine stopped in the machine cycle.**
2. **Using the interconnect cable, connect the PC to the PLC.**
  - When connecting to a 5/15 or 5/25 - Connect the PC cable to the PEER COMM INTFC communication port (that is for the programming terminal) on the front panel of the PLC.
  - When connecting to a 5/40 - Connect the PC cable to the Data Highway+ communication port Channel 1A on the front panel on the PLC. If communication is not established, connect to the Channel 2A.
3. **Turn the PC power on.**
  - The ALLEN-BRADLEY MAIN MENU INTERFACE screen displays.
  - If the PC boots up to DOS, perform these steps: At the C:\ prompt, type `cd\ipds`. Press <Enter>. Type `abmenu` and then press <Enter>. The ALLEN-BRADLEY MAIN MENU INTERFACE screen displays.
4. **Press the <PLC-5> function key.**
  - The PLC-5 PROGRAMMING SOFTWARE screen displays.
  - There are two paths for connecting to the PLC. You can go through the WHO screens or go directly online to the PLC station. When you are operating at a stand-alone station, you can go directly online. Electricians frequently use the WHO screens when connected to a data highway. If the PC is connected to a highway, go to step 5. If not, go to step 7.
5. **Press the <Who> function key.**
  - DH+ NETWORK MENU displays.
6. **Press the <Who Active> function key.**
  - The WHO ACTIVE - Active Station Identification screen displays the stations on the highway.

**7. Go online.**

- Cursor to the PLC station you need to connect to, using the arrow keys.
- Press the <Online Program> function key. The “Working” message flashes. The PROGRAM DIRECTORY FOR PROCESSOR screen displays. “ONLINE” appears on the top line, to the right of the processor’s name. You are now connected to the PLC.

**8. Press the <Monitor File> function key.**

**9. Check the Ladder Diagram inputs and outputs, using the terminal display.**

- If troubleshooting a Discrete I/O Module:

<b>IF the Ladder Diagram</b>	<b>AND IF the corresponding LED indicator on the</b>	<b>THEN:</b>
input is false (OFF)	input card is illuminated (ON)	Replace the I/O module.
	input card is not illuminated (OFF)	The problem is outside of the PLC.
output is true (ON)	output card is not illuminated (OFF)	Check the blown fuse indicator.  If the FUSE BLOWN indicator is illuminated, replace the fuse. If the FUSE BLOWN indicator is not illuminated, replace the I/O module.
	output card is illuminated (ON) and the fuse is not blown	The problem is outside the PLC.

- If troubleshooting an Intelligent I/O module:

STEP	ACTION
1. Check the LED status indicators.	If the status indicators indicate a problem, refer to the Diagnostic and Troubleshooting sections of the I/O Module User's Manual.
2. Look at the STATUS word.	<p>Check the Diagnostics and Troubleshooting sections of the User's Manual to determine the STATUS word in the READ BLOCK TRANSFER. Example: STATUS word is 5 for an Output Module.</p> <ol style="list-style-type: none"> <li>1. Check the location of the Data File in the BTR dialog box.</li> <li>2. Press the &lt;Data Monitor&gt; function key. Type in the address of the Data File at the prompt. Press &lt;Enter&gt;. The Data Monitor for th file displays.</li> <li>3. Move the cursor to the STATUS word.</li> <li>4. Press the &lt;Change Radix&gt; function key. The Data Monitor displays the Change Radix selections. You can change the format of the data that the Data Monitor displays. Changing the number base allows you to examine each bit individually.</li> <li>5. Press the &lt;Binary&gt; function key.</li> <li>6. Refer to the User's Manual to see what each bit reposesents.</li> </ol>
3. Check to see what type of result you can expect.	<p>Refer to the User's Manual.</p> <ol style="list-style-type: none"> <li>1. Check the parameters the module uses and what the parameters are used for.</li> <li>2. Determine which file contains the parameter and go to the BLOCK WRITE that transfers the parameter to the module.</li> <li>3. Determine how the module is supposed to function.</li> </ol> <p>Example: An Analog module with a maximum scale parameter of 100 and a command of 20 should produce 2 volts. If the module is not performing as determined above, then replace the module.</p>

## 10. Exit the PLC-5 software.

- Press the <Return to Menu> function key. The PLC-5 PROGRAMMING SOFTWARE screen displays.
- Press the <Exit Sys> function key. The ALLEN-BRADLEY MAIN MENU INTERFACE screen displays.



**11. Disconnect the PC from the PLC processor.**

- Power down the PC.
- Remove the interconnect cable from the PLC communication port.



## Concept Check

### Troubleshoot I/O Module

Answer the following questions to check your understanding of troubleshooting an I/O module. Circle the correct answer in each question. Then compare your responses with the answers at the bottom of this page. Some of the questions may have more than one correct answer. If you have difficulty answering a question, review the Skill Development Guide or ask your Trainer for assistance.

1. If you are troubleshooting a Discrete I/O module. The module is probably faulty if the
  - a. Data Table input is false and the corresponding indicator on the input card is illuminated.
  - b. Data Table input is false and the corresponding indicator on the input card is not illuminated.
  - c. Data Table output is true; the corresponding indicator on the output card is not illuminated; and the FUSE BLOWN indicator is illuminated.
  - d. Data Table output is true; the corresponding indicator on the output card is illuminated; and the FUSE BLOWN indicator is not illuminated.
2. What is the first action you take when troubleshooting an I/O module?
  - a. Check the LED status indicator.
  - b. Display the ladder file.
  - c. Refer to the Diagnostics and Troubleshooting sections of the User's Manual.
  - d. none of the above

3. Which number base allows you to examine individual bits?
- a. decimal data
  - b. octal data
  - c. binary data
  - d. hexadecimal/BCD Data

Answers: (1. a, d 2. a 3. c)

### **Next Step**

If you are ready to demonstrate the task now, ask your Evaluator or Trainer to schedule the Skill Check. However, if you need to practice some of the steps first, continue to the next section.



## Practice

The following practice will help prepare you for the Skill Check. Ask your Trainer to set up the practice for you. After you complete a practice, ask your Trainer to check your work.

### Practice

Practice troubleshooting an I/O module. Your Trainer will set up a hardware or software problem for the troubleshooting task. While your Trainer observes, demonstrate and explain the steps for checking the I/O module's indicator lights and monitoring the data. Identify the problem and recommend the corrective action.

Be prepared to demonstrate safe work practices during this activity.

### Practice Objective

You should identify the problem and recommend the appropriate corrective action. You should demonstrate safe work practices during the task steps.

## Next Step

Continue to practice until you are ready for the Skill Check. When you are ready to demonstrate the task, ask your Evaluator or Trainer to schedule the Skill Check.