

# K-11b

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## ELECTRICIAN TRAINING

### TRAINER'S GUIDE

Duty K: PLC (Modicon)

**K-11b: Troubleshoot PLC-Controlled Machine**

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## **Instructions To The Trainer**

1. The Learner will contact you when ready to practice troubleshooting a PLC-controlled machine.
2. Be prepared to demonstrate the steps for this task.
3. Ask the Learner to contact the Evaluator when ready for the Skill Check.



## **Skill Objective**

Upon receiving a request from an Operator, Electrical Technician, or Electrical Engineer to troubleshoot a PLC-controlled machine, troubleshoot the machine.

### **Task Standards**

1. The problem device is identified.
2. The appropriate corrective actions are recommended.

## What The Learner Will Need

This section contains the safety information, tools, and resources you will need before troubleshooting a PLC-controlled machine.



- Follow all Caterpillar Facility Safety Standards when performing this task in the plant.
- You will perform this task online. Perform the steps carefully; mistakes could result in injury to personnel or damage to the equipment.
- Visually check to ensure no physical problems are present before attempting to cycle the machine.
- Use caution when working around the PLC; high voltage is present on the inside of the PLC cabinet door and near the 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
- Interconnect cable
- Basic electrical hand tools
- Voltmeter
- PLC location



- Electrical Schematics
- Ladder Diagram printout
- Diagnostic screens (Marquee, Display)
- Safe Job Procedures



## Practice Set-Up

The Learner may perform the following practice to help prepare for the Skill Check. Set up the practice for the Learner. Assist the Learner during the practice, if necessary; answer any questions concerning the task; and be prepared to demonstrate the task to the Learner. Make sure the Learner follows safe work practices while practicing the task.

### Practice 1

Locate a PLC location where the Learner can practice task. The Ladder Diagram printout and Electrical Schematics need to be available for reference. The Learner may perform the practice online. Open the ladder program and cursor to one of the input devices on a rung. Ask the Learner to use the Ladder Diagram printout and Electrical Schematics to identify the type of device and the location of the device.

### Practice Objective 1

Using the Electrical Schematics and the Cross Reference section of Ladder Diagram printout, the Learner should locate and identify the device causing the problem.

### Practice 2

Designate a PLC-controlled machine for the Learner to troubleshoot. Notify the personnel in the area that the PLC will be temporarily in use for training. Insert a problem into the hardware or software (program). Use one of the following problems or create a condition that would require troubleshooting.

- Place a blown fuse in an output card to simulate a possible external problem.
- Remove a wire on a switch to simulate a bad switch or input problem.
- Remove power common from an input card.
- Remove a wire from an output device to simulate a bad coil or light.
- Unlatch a latching coil internally to cause a cycle problem.
- Force off an input or output.
- Use a MCR function to disable a part of the ladder logic until certain conditions are met, such as hydraulics on, safety switches in the proper state, or an E-Stop string not made.

## **Practice Objective 2**

The Learner should identify the problem and recommend the appropriate corrective action(s).

### **Next Step**

Allow the Learner to continue practicing and developing skills needed to demonstrate the task. The Learner should ask the Evaluator to schedule a Skill Check whenever he or she is ready to demonstrate the task unaided and meet all the task standards and safe work practices.

