




Module 2 - Troubleshooting Electrical Circuits II

In Module 2, the students will be introduced to 15-20 NEMA electrical symbols used in common electrical circuits, as well as an in depth study of the types of electrical switches. The students will also be introduced to troubleshooting simulation circuits in a virtual environment. A focus will be on more complex electrical circuits that will be simulated virtually, as well as used in the hands-on lab environment. The students will continue developing their troubleshooting skills in basic electrical circuits, as well as to predict what could cause a circuit to become faulty. [Click here](#) to view the student learning outcomes for this module.

 [IND220 Module 2 Learning Sequence Sheet.pdf](#)

Readings and Learning Activities:




Complete the following assignments to ensure you have the proper knowledge and skills needed to successfully pass the Knowledge and Application Assessment (KAA) and the Hands-On Assessment (HOA).


► Textbook Readings: Troubleshooting Electrical/Electronic Systems, by Glen A Mazur & Thomas E Proctor, American Technical Publishers, Third Edition

- **Chapter 3 - Symbols and Circuits**
 - Electrical Symbols and Abbreviations; Series, Parallel, and Series/Parallel Connections
 - Circuit Polarity, Batteries and Solarcells,
- **Chapter 7 - Basic Circuit Measurements**
 - Branch Circuit Voltage Drop Measurements, Recording Minimum and Maximum Readings
 - Meter Loading Effect, Voltmeter Circuit Connections, Harmonic Distortion
 - Troubleshooting Fuses, Troubleshooting Circuit Breakers
- **Appendix - Electrical Symbols, Page 590-591**
 - Troubleshooting Electromechanical Relays

► Learning Activity - Videos and PDFs that explain hydraulic system basics

 [Video: How 3-way switches work in your home](#)


 [PDF: IND220 Module 2 Basic Electrical Symbols 081820.pdf](#)


 [PDF: Link to the EATON Comparison of NEMA and IEC Schematic Diagrams](#)


 [PDF: Link to Explanation of Switches](#)

 [PDF: Link to an illustration of various types of switches](#)


 [PDF: Link to Switches Demystified](#)

 [Video: Explanation of Lab 2.1 Circuits 1 and 2 082620](#)


 [Video: Explanation of Lab 2.1 Circuit 3 082620](#)


 [Video: Explanation of Lab 2.3 Circuit 1 082420](#)


 [Video: Explanation of Lab 2.3 Circuit 2 082420](#)


 [Video: Troubleshooting Faults in Automation Studio 082620](#)

Knowledge & Application Assessment (KAA):

 You must **score at least 80%** on the assessment before you can take the Hands-On Assessment. If you do not score 80% or above, you will need to meet with the instructor to review the course material before you can retake the KAA quiz. We want you to be successful and we will work with you as much as needed to help you pass the assessment.

 [Video: How to prepare for the KAA assessments in the Hybrid course model](#)

 [IND220 Module 2 KAA Study Guide.pdf](#)

 [IND220 Module 2 KAA Practice Quiz](#)


Lab Opportunity:





It is a good idea to practice these labs several times to ensure that you will perform well when you take the Knowledge and Application Assessment and the Hands-On Assessment.


- Contact the lab instructor for extra lab time using the machines to practice mastering the skills listed in the module Hands-on Assessment (HOA).
- The more you practice, the more you will build skills that are marketable to industry employers!

 [IND220 Lab 2.1 AS 3-way and 4-way Switch Circuits.pdf](#)


 [IND220 Lab 2.2 HL 3 and 4-way Switch and Motor Circuits.pdf](#)


 [IND220 Lab 2.3 AS Troubleshooting Basic Electrical Circuits.pdf](#)

 [IND220 Lab 2.4 HL Troubleshooting Basic Electrical Circuits.pdf](#)


 [IND220 Lab 2.5 AS Troubleshooting Faults in an Electrical Circuit.pdf](#)

► Student Lab Resources - After a student performs a lab exercise, they can review information on questions within the lab:


 [IND220 Lab 2.1 AS 3-way and 4-way Switch Circuits Student Resources.pdf](#)


 [IND220 Lab 2.3 AS Troubleshooting Basic Electrical Circuits Student Resources.pdf](#)


► Learning Activity - Automation Studio Simulation files for Lab Exercises for this module (Open only in the Virtual Machine)

 [IND220 Lab 2.1 Circuit 1.prx](#)

 [IND220 Lab 2.1 Circuit 2.prx](#)

 [IND220 Lab 2.1 Circuit 3.prx](#)

 [IND220 Lab 2.3 Circuit 1.prx](#)

 [IND220 Lab 2.3 Circuit 2.prx](#)

 [IND220 Lab 2.5 Circuit 1.prx](#)

Automation Studio Simulator:

 <https://connect.northweststate.edu>

This is the link to the Automation Studio Virtual Machine for you to practice anywhere you have an Internet connection. Open Sakai within the Virtual Machine, then click on the following .PRX files to run the simulations.

Hands-on Assessment:





You must **score 100%** on the assessment to pass this course. If you do not score 100%, you must see the instructor before continuing with the course.

 [IND220 Module 2 Hands-On Assessment.pdf](#)

Back



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