



Hale Instructional Lab Activity Objectives

INDUSTRIAL ELECTRICITY

PROGRAMMABLE LOGIC CONTROLLERS

MICRO850 LAB OUTLINE

Lab 1 WORKING SAFELY WITH ELECTRICITY

At the completion of this lab, learner will be able to:

1. Work more safely with electricity.
2. Use personal safety equipment to protect yourself against the hazards of electricity

Lab 2 MANUAL, SEMI-AUTOMATIC & AUTOMATIC OPERATION

At the completion of this lab, learner will be able to:

1. Distinguish between manual and semi-automatic operating modes.
2. Identify the steps required to operate a drill station in manual mode.
3. Identify the sequence of events required to operate a drill station in semi-automatic mode.

Lab 3 HALE AUTOMATION TRAINER FAMILIARIZATION

At the completion of this lab, learner will be able to:

1. Identify the major components on the trainer.
2. Explain the function and features of the major components.
3. Energize the trainer.
4. Troubleshoot the trainer power circuit.

Lab 4 ANALOG I/O DEVICES

At the completion of this lab, learner will be able to:

1. Identify analog I/O devices on the trainer.
2. Read and interpret analog scales.
3. Identify the terminals on a potentiometer.
4. Use resistance measurements to check the operation of a potentiometer.
5. Calculate the minimum and maximum current values in an analog circuit.
6. Construct and test an analog input and output circuit

Lab 5 DIGITAL I/O DEVICES

At the completion of this lab, learner will be able to:

1. Identify digital I/O devices on the trainer.
2. List digital I/O devices used with PLCs.
3. Measure voltage levels in a digital circuit.
4. Construct and test digital input and output circuits.

Lab 6 ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

At the completion of this lab, learner will be able to:

1. Connect an anti-static wrist strap to a suitable ground.
2. Demonstrate the proper procedure for handling ESD sensitive components.
3. Remove and install a module in a PLC.

Lab 7 MICRO800 PROGRAMMABLE CONTROLLER FAMILY

At the completion of this lab, learner will be able to:

1. Understand common PLC terms and specifications
2. Distinguish between embedded, plug-in and expansion I/O
3. Identify PTO and HSC I/O points on a PLC
4. Use manufacturer's sales literature to select PLC controllers, modules and accessories

Lab 8 MICRO850 TRAINER FAMILIARIZATION

At the completion of this lab, learner will be able to:

1. Determine the electrical specifications for a controller from its catalog number.
2. Identify embedded and plug-in I/O on a Micro850 controller.
3. Use a technical reference to learn the function of I/O and controller status LEDs.
4. List the three operating modes of a controller.

Lab 9 POWER SUPPLY CALCULATIONS

At the completion of this lab, learner will be able to:

1. Use specifications to calculate the maximum power output of a DC power supply.
2. Determine the power requirements of a module.
3. Calculate the power requirements of a PLC.
4. Calculate the load on a power supply.
5. Determine if a power supply is overloaded.

Lab 10 PLC POWER CONTROL & SAFETY CIRCUITS

At the completion of this lab, learner will be able to:

1. Distinguish between PLC power and I/O power supplies.
2. Identify safety components in a PLC power control & safety circuit.
3. Draw wiring diagrams of grounded and ungrounded PLC power control & safety circuits.

Lab 11 INSTALLING CONNECTED COMPONENTS WORKBENCH

At the completion of this lab, learner will be able to:

1. Explain the concept of the "Connected Components" system.
2. List the hardware components of the Connected Components system.
3. Distinguish between CCW and CCAT software

Lab 12 RSLINX COMMUNICATIONS SOFTWARE

At the completion of this lab, learner will be able to:

1. Identify connectors used in PLC communications.
2. Connect a PLC to a laptop PC using USB and RS-232 ports.
3. Use RSLinx software to establish communications between a PC and PLC.
4. Use RSWho software to identify devices on a network.
5. Determine when devices are removed from a network



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Lab 13 INTRO TO CONNECTED COMPONENTS WORKSHOP

At the completion of this lab, learner will be able to:

1. Restore the Program Environment to factory default settings.
2. Open an existing CCW project.
3. Identify features menus and toolbars in the development environment.
4. Distinguish between ladder diagram, functional block diagram and structured text PLC programs.

Lab 14 USING HELP & SUPPORT DOCUMENTATION

At the completion of this lab, learner will be able to:

1. Use context sensitive help.
2. Search for help on a specific topic.
3. Obtain revision and software serial numbers.
4. Locate technical information in PDF format.

Lab 15 CREATING A CCW PROJECT

At the completion of this lab, learner will be able to:

1. Use context sensitive help.
2. Search for help on a specific topic.
3. Obtain revision and software serial numbers.
4. Locate technical information in PDF format.

Lab 16 DIGITAL INPUT CIRCUITS

At the completion of this lab, learner will be able to:

1. Select a controller for a project.
2. Add plug-in modules to a controller.
3. Configure plug-in modules.
4. Add ladder diagram (LD) program files to a project
5. Save a project.

Lab 17 ANALOG INPUT CIRCUITS

At the completion of this lab, learner will be able to:

1. Identify input channels and terminal groups.
2. Construct and test an analog input circuit.
3. Use software to configure an analog input module.
4. Check an input for a ground loop.
5. Determine an analog value in the input table.

Lab 18 DIGITAL OUTPUT CIRCUITS

At the completion of this lab, learner will be able to:

1. Identify output terminals and output terminal groups.
2. Connect output devices to a PLC.
3. Explain the safety hazards associated with forcing outputs.
4. Force PLC outputs on and off.
5. Use a voltage tester to measure PLC output voltages.
6. Check the status of an output in the Global Variables file

Lab 19 ANALOG OUTPUT CIRCUITS

At the completion of this lab, learner will be able to:

1. Identify output channels and terminal groups.
2. Construct and test an analog output circuit.
3. Use software to configure an analog output module.
4. Check an output for a ground loop.
5. Change an analog value in the output table

Lab 20 COMPUTER NUMBER SYSTEMS

At the completion of this lab, learner will be able to:

1. Count using binary, octal and hexadecimal number systems.
2. Convert numbers from one number system to another.
3. Label points on I/O modules in octal.

Lab 21 UPDATING PLC FIRMWARE

At the completion of this lab, learner will be able to:

1. Explain the function of firmware.
2. Determine the revision (version) of firmware in a PLC.
3. "Flash" upgrade firmware in a PLC.

Lab 22 PROCESSOR OPERATIONS

At the completion of this lab, learner will be able to:

1. Identify the name and catalog number of a controller.
2. Determine the current memory usage and available space.
3. Determine the firmware revision number.
4. Use status indicator LEDs to identify a processor fault.
5. Diagnose a processor fault using error codes.
6. Clear a processor fault.

Lab 23 LADDER DIAGRAM LANGUAGE EDITOR

At the completion of this lab, learner will be able to:

1. Add program elements to a rung
2. Delete program elements from a rung
3. Assign a variable (name) to rung element
4. Insert a branch into a rung
5. Add & delete program rungs
6. Use the spacebar to change rung elements

Lab 24 MOTOR CONTROL PROJECT

At the completion of this lab, learner will be able to:

1. List the steps required to implement a PLC project.
2. Connect I/O devices to a PLC.
3. Create a LD program and download it to a PLC.
4. Use a laptop PC to monitor the operation of a PLC program.
5. Identify a surge suppressor.
6. Explain why a direct contact is used to represent a stop button in a PLC.
7. Distinguish between logical and auxiliary seal-in contacts

Lab 25 TIMER INSTRUCTIONS

At the completion of this lab, learner will be able to:

1. Distinguish between on-delay and off-delay timers.
2. Program on-delay and off-delay timers in a PLC.
3. Explain the operation of on-delay and off-delay timers.

Lab 26 COUNTER INSTRUCTIONS

At the completion of this lab, learner will be able to:

1. Distinguish between count-up and count-down counters.
2. Program up and down counter instructions in a PLC.
3. Explain the operation of count-up and count-down counters.

Lab 27 DOCUMENTING A PROJECT

At the completion of this lab, learner will be able to:

1. Generate CCW project documentation in MS Word or Adobe PDF file formats.
2. Create documentation for an entire CCW project.
3. Create documentation for parts of a CCW project

Lab 28 PASSWORD PROTECTION

At the completion of this lab, learner will be able to:

1. Determine if a controller is password protected
2. Set a controller password.
3. Connect to a password protected controller.
4. Remove password protection from a controller.



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