Hale Instructional Course Curriculum

INDUSTRIAL ELECTRICITY — PROGRAMMABLE LOGIC CONTROLLERS — COURSE OUTLINE

UNIT 1 MACHINE & PROCESS CONTROL *3/4 Hour*

Table of Contents/Objectives
1. The Machine Age
2. Hard Wired Logic
3. Changing Control Logic
4. Programmable Logic Controller

Unit Summary

Review Quiz

Hands On Exercises

Lab 1 Working Safely with Electricity

UNIT 2 CONTROL COMPONENTS *1 Hour*

Table of Contents/Objectives
1. PLC Components
2. Analog and Digital Data
3. Input Component
4. Output Component
5. Control Processing Unit
6. Programming Devices
7. Memory Component Power Supply Component
8. Assembling PLC Components

Unit Summary

Review Quiz

Hands On Exercises

Lab 2 Manual, Semi-Automatic & Automatic Machine Control

UNIT 3 HARDWARE CONFIGURATIONS *2 Hours*

Table of Contents/Objectives
1. Hardware Configurations
2. Integral Configuration
3. Module Configuration
4. Chassis
5. Module Placement
6. Keying
7. Handling ESD Sensitive Modules

Unit Summary

Review Quiz

Hands On Exercises

Lab 3 Hale Automation Trainer Familiarization
Lab 4 Analog I/O Devices
Lab 5 Digital I/O Devices
Lab 6 Electrostatic Discharge (ESD) Precautions
Lab 7 Micro800 Programmable Controller Family
Lab 8 Micro850 Familiarization

UNIT 4 POWER SUPPLIES ***2 Hours***

Table of Contents/Objectives
1. Function of the Power Supply
2. Power Supply Configurations
3. Line Voltage Connections
4. AC Line Overload Protection
5. Power Line Connections
6. Constant Voltage Transformer
7. Isolation Transformer
8. Surge Suppressors and Line Filters
9. Power Supply Types
10. Common Power Source
11. Grounding
12. Battery Backup

POWER SUPPLIES *continued*

13. Safety Circuits
14. Main Power Disconnect
15. Master Control Relay
16. Troubleshooting Power Supplies

Unit Summary

Review Quiz

Hands On Exercises

Lab 9 Power Supply Calculations
Lab 10 PLC Power Control & Safety Circuits
Lab 11 Installing Connected Components Workbench
Lab 12 RSLinx Communications Software
Lab 13 Introduction to Connected Components Workbench
Lab 14 Using Help & Support Documentation
Lab 15 Creating a CCW Project

UNIT 5 DISCRETE INPUT MODULES *1 Hours*

Table of Contents/Objectives
1. Types of Input Modules
2. Discrete AC Input Modules
3. Discrete DC Input Modules
4. Isolated Input Modules
5. Source and Sink Input Modules
6. TTL Input Modules
7. Fast Response DC Input Modules
8. Module Density
9. Input Image Table
10. Troubleshooting Discrete Input Modules

Unit **Summary**

Review Quiz

Hands On Exercises

Lab 16 Digital Input Circuits

Hale Instructional Course Curriculum

INDUSTRIAL ELECTRICITY — PROGRAMMABLE LOGIC CONTROLLERS — COURSE OUTLINE

UNIT 6 ANALOG INPUT MODULES *1.5 Hours*

Table of Contents/Objectives
1. Analog Input Data
2. Transducers and Transmitters
3. Shielded Cable and Ground Loops
4. Single Ended and Differential Inputs
5. Resolution
6. Selecting and Configuring Analog

Summary of Unit 6

Review Quiz

Hands On Exercises

Lab 17 Analog Input Circuits

UNIT 7 DISCRETE OUTPUT MODULES *1.5 Hours*

Table of Contents/Objectives
1. Types of Output Modules
2. Discrete AC Output Modules
3. Current Ratings
4. Leakage Current
5. Discrete DC Output Modules
6. Contact Output Modules
7. Interposing Relays
8. TTL Output Modules
9. Output Image Table
10. Troubleshooting Discrete Output Modules

Summary of Unit 7

Review Quiz

Hands On Exercises

Lab 18 Digital Output Circuits

UNIT 8 ANALOG OUTPUT MODULES *2 Hours*
1. Analog Output
2. Digital to Analog Conversion
3. Selecting and Configuring Analog Output Modules
4. Power Supply Connections
5. Hardware Configuration
6. Analog Output Wiring Diagram
7. Software Configuration
8. Current to Pressure (I/P) Converters
9. Valve Actuators
10. Variable Speed Drives
11. Current to Pressure Transducers (I/P Converters)
12. Troubleshooting Analog Output Modules

Unit Summary

Review Quiz

Hands On Exercises

Lab 19 Analog Output Circuits

UNIT 9 PROCESSOR OPERATIONS ***3 Hours***

Table of Contents/Objectives
1. Processor Functions
2. Scan Cycle
3. Scan Time
4. Processor Characteristics
5. Computer Number Systems
6. Binary Number System
7. Octal Number System
8. Hexadecimal Number System
9. Addressing
10. Operating Modes
11. Communication Ports

PROCESSOR OPERATIONS *continued*
12. Diagnostic Testing
13. Processor Troubleshooting
14. Processor Status File
15. Error Recovery

Unit Summary

Review Quiz

Hands On Exercises

Lab 29 Computer Number Systems
Lab 30 Updating PLC Firmware
Lab 31 Processor Operations

UNIT 10 PLC PROGRAMMING *5 Hours*

Table of Contents/Objectives
1. PLC Programming
2. Continuity
3. Power Flow
4. Relay Instructions
5. Timer instructions
6. CounterInstructions
7. Comparison Instructions
8. Data Movement Instructions
9. Math Instructions
10. Bit Operations
11. Flow Control Instructions

Unit Summary

Review Quiz

Hands On Exercises

Lab 23 Ladder Diagram (LD) Language Editor
Lab 24 Motor Control Projects
Lab 25 Timer Instructions
Lab 26 Counter Instructions
Lab 27 Documenting a Project
Lab 28 Password Protection