

# Electromechanical Controls

<b>Unit: 1-4</b>	Electronic Control Systems
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Identify electronic control systems, including closed loop and open loop.</li> <li>2. Interpret symbols used in control circuit diagrams. Examples: switches, relays, motors.</li> <li>3. Explain input and output devices used in electronic control systems, including switches, sensors, transducers, relays, timers, counters, motors, and actuators.</li> <li>4. Interpret control ladder logic circuits.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Recognize the differences in manual and automatic motor control systems.</li> <li>2. Examine the operation of Direct Current motor drives.</li> <li>3. Correlate schematic symbols to actual devices.</li> <li>4. Explore the use of various inputs to match the capabilities of the control system.</li> <li>5. Select outputs that best match the device to be controlled.</li> <li>6. Correlate a ladder diagram to a flow chart.</li> <li>7. Compare ladder logic symbols to digital logic gates.</li> </ol>
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<b>Essential Question(s):</b>	How have control systems evolved over the past decade?
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Content Knowledge	Suggested Instructional Activities Rigor & Relevance Framework (Quadrant)	Suggested Materials, Equipment and Technology Resources
<ol style="list-style-type: none"> <li>1. Switches</li> <li>2. Transducers</li> <li>3. Interfaces</li> <li>4. Various sensors.</li> <li>5. Analog</li> <li>6. Digital</li> <li>7. Drives</li> <li>8. Safety Equipment</li> <li>9. Timer</li> </ol>	<p>Lecture Guest Speakers Worksheets Definitions Group discussions Team work – Hazard evaluation Problem Solving – Hazard elimination Lab demonstration and experiment Group investigation</p>	<p>Projector Worksheets Quizzes Tests Internet access Handouts Appropriate texts Assorted safety equipment and PPE</p>

10. Counter 11. Valves 12. Actuators 13. Hydraulic 14. Pneumatic	Listen, think, pair, share Problem solving exercises	
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<b>Unit Assessment:</b>	Evaluation of student practices in the classroom and in the laboratory Written and performance assessments
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<b>Unit/Course CTSO Activity:</b>	<ol style="list-style-type: none"> <li>1. Continue SkillsUSA Leadership Development Programs.</li> <li>2. Establish documentation for students' career portfolio.</li> <li>3. Students review SkillsUSA Technical Standards and Contest Projects.</li> </ol>
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<b>Unit/Course Culminating Product:</b>	Student portfolio items to include safety tests passed at 100% Injury free students at the end of the course
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<b>Course/Program Credential(s):</b> <input type="checkbox"/> Credential <input type="checkbox"/> Certificate <input type="checkbox"/> Postsecondary Degree <input type="checkbox"/> University Degree <input type="checkbox"/> Other:
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# Electromechanical Controls

<b>Unit: 5-7</b>	Programmable Logic Controllers
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>5. Identify uses of programmable logic controllers.</li> <li>6. Install programmable logic controllers with input and output devices.</li> <li>7. Program a controller to perform a specific task.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Explore the possibilities of using programmable logic controllers.</li> <li>2. State residential and commercial applications where programmable logic controllers might be used.</li> <li>3. Safely install and connect input devices to programmable logic controllers utilizing correct voltages.</li> <li>4. Safely install and connect output devices to programmable logic controllers utilizing correct voltages and protection.</li> <li>5. Correlate inputs to real world devices.</li> <li>6. Write ladder logic programs for multiple of programmable logic controllers.</li> <li>7. Develop a ladder logic diagram to perform a specific function.</li> </ol>
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<b>Essential Question(s):</b>	How do ladder logic diagrams correlate to relay logic diagrams?
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Content Knowledge	Suggested Instructional Activities Rigor & Relevance Framework (Quadrant)	Suggested Materials, Equipment and Technology Resources
<ol style="list-style-type: none"> <li>1. Switches</li> <li>2. Transducers</li> <li>3. Interfaces</li> <li>4. Various sensors.</li> <li>5. Analog</li> <li>6. Digital</li> <li>7. Drives</li> <li>8. Safety Equipment</li> <li>9. Timer</li> <li>10. Counter</li> </ol>	<p>Lecture            Guest Speakers            Worksheets            Definitions            Group discussions            Team work – Hazard evaluation            Problem Solving – Hazard elimination            Lab demonstration and experiment            Group investigation            Listen, think, pair, share</p>	<p>Projector            Worksheets            Quizzes            Tests            Internet access            Handouts            Appropriate texts            Assorted safety equipment and PPE            Training material for OSHA 500 or 501            National Electrical Code (NEC)</p>

11. Valves 12. Actuators 13. Hydraulic 14. Pneumatic 15. Programmable Logic Controllers 16. Schematic Symbols	Problem solving exercises	
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<b>Unit Assessment:</b>	Evaluation of student practices in the classroom and in the laboratory Written and performance assessments
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<b>Unit/Course CTSO Activity:</b>	<ol style="list-style-type: none"> <li>1. Continue SkillsUSA Leadership Development Programs.</li> <li>2. Establish documentation for students' career portfolio.</li> <li>3. Students review SkillsUSA Technical Standards and Contest Projects.</li> </ol>
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<b>Unit/Course Culminating Product:</b>	Student portfolio items to include safety tests passed at 100% Injury free students at the end of the course
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# Electromechanical Controls

<b>Unit: 8-12</b>	Robotics
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<b>Content Standard(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>8. Interpret construction, electrical, and mechanical blueprints related to a variety of automated systems.</li> <li>9. Use input and output devices for performing automated and robotic tasks.</li> <li>10. Explain the operation of fluid power systems related to a variety of automated systems.</li> <li>11. Construct a robot to perform a specific task.</li> <li>12. Evaluate robotic activities, including identifying problems and making necessary repairs.</li> </ol>
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<b>Learning Objective(s) and Depth of Knowledge Level(s):</b>	<p>Students will:</p> <ol style="list-style-type: none"> <li>1. Correlate construction, electrical, and mechanical schematic symbols to real world devices.</li> <li>2. Determine proper input and output devices to complete automated and robotic tasks.</li> <li>3. Utilize pneumatic and hydraulic systems to perform specific functions.</li> <li>4. Design, construct, and build a robotic arm to lift, move, and place an item in a specific location.</li> <li>5. Troubleshoot robotic abnormalities.</li> <li>6. Identify and correct errors in robotics programs.</li> </ol>
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<b>Essential Question(s):</b>	What are some uses for robots in everyday life?
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Content Knowledge	Suggested Instructional Activities Rigor & Relevance Framework (Quadrant)	Suggested Materials, Equipment and Technology Resources
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12. Actuators 13. Hydraulic 14. Pneumatic 15. Programmable Logic Controllers 16. Schematic Symbols 17. Robots		
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<b>Unit Assessment:</b>	Evaluation of student practices in the classroom and in the laboratory Written and performance assessments
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<b>Unit/Course CTSO Activity:</b>	1. Continue SkillsUSA Leadership Development Programs. 2. Establish documentation for students' career portfolio. 3. Students review SkillsUSA Technical Standards and Contest Projects.
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<b>Unit/Course Culminating Product:</b>	Student portfolio items to include safety tests passed at 100% Injury free students at the end of the course
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