

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

**ACADEMIC AFFAIRS**

Course Number: ENGY 220 Department: Energy Systems Technology

Course Title: Combustion Control Circuits Semester: Spring Year: 1997

**Objectives/Competencies**

<b>Course Objective</b>	<b>Competencies</b>
1. Stack-mounted primary control.	<ol style="list-style-type: none"><li>1. Explain how to install control.</li><li>2. Define temperature limits of control.</li><li>3. Explain how to adjust ignition timing.</li><li>4. Explain recycle feature of control.</li></ol>
2. Cad cell primary control.	<ol style="list-style-type: none"><li>1. Explain operation of 3 and 4 wire control.</li><li>2. Describe how control is wired to limit circuit.</li><li>3. Explain reset procedure on electronic control.</li><li>4. Explain reason for jumping T-T.</li></ol>
3. Forced hot water control schematics.	<ol style="list-style-type: none"><li>1. Describe wiring of low limit and circulation control.</li><li>2. Explain operation of high limit control.</li><li>3. Explain function of 1k relay.</li></ol>
4. Hot water zoning schematics.	<ol style="list-style-type: none"><li>1. Explain function of ZR and ZC terminals.</li><li>2. Explain thermostat activation of burner/circulating pump.</li><li>3. Explain zoning with relay and separate circulator.</li><li>4. Explain zoning with zone valves.</li></ol>

Course Objective	Competencies
5. Commercial cad cell control systems.	5. Operation of end switch and how a valve is driven open.  1. Explain use of add-on timers. 2. Explain use of solenoid valves.
6. Commercial cad cell control systems.	1. Explain how burner motor is activated using a contactor.
7. Commercial primary controls.	1. Explain flame failure response time. 2. Explain function of combustion air proving switch. 3. Explain reason for pilot flame. 4. Define direct spark ignition. 5. Define pre-purge.
8. Gas trains/pressure switches.	1. Explain components in gas train. 2. Explain operation of pressure switches. 3. Explain operation of vent valves. 4. Define low and high gas pressures.
9. Flame rod sensing devices.	1. Define term rectification. 2. Explain reason for rectification. 3. Describe location of flame rod.
10. Optical flame detectors.	1. List types of optical flame detectors. 2. Describe difference from cad cell control. 3. Describe advantages over sending controls.
11. Photocell detector.	1. Describe type of fuel's flame it will detect. 2. Describe flame signal readings.

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<p>12. Infrared detector.</p>	<ol style="list-style-type: none"> <li>3. Describe rectifying photocell.</li> <li>4. Explain use of filters and orifices.</li> <li>1. Explain type of flame it must see.</li> <li>2. Explain construction of cell.</li> <li>3. Explain flame signal readings.</li> <li>4. List types of flames it will detect.</li> </ol>
<p>13. Ultraviolet detector.</p>	<ol style="list-style-type: none"> <li>1. Describe glass used with UV detector.</li> <li>2. List types of flames it will detect.</li> <li>3. Describe mini and self-check UV detectors.</li> </ol>
<p>14. Honeywell 890F and Fireye M-series controls.</p>	<ol style="list-style-type: none"> <li>1. List advantages owner cad cell control.</li> <li>2. List limitations of controls.</li> <li>3. Describe ignition trials.</li> <li>4. Describe re-light feature of control.</li> </ol>
<p>15. Programming controls.</p>	<ol style="list-style-type: none"> <li>1. List additional features over primary controls.</li> <li>2. Define ignition trials.</li> <li>3. List proper sequence of timed operations.</li> <li>4. Explain modulating control circuit.</li> </ol>
<p>16. Electro-mechanical programmers.</p>	<ol style="list-style-type: none"> <li>1. Describe operation of timer motor and contacts.</li> <li>2. Explain internal schematic of relays and contacts.</li> <li>3. Describe service of contacts.</li> </ol>
<p>17. Microcomputer controls.</p>	<ol style="list-style-type: none"> <li>1. Describe inputs and outputs of control.</li> <li>2. Describe display features of control.</li> </ol>

<b>Course Objective</b>	<b>Competencies</b>
18. Industrial boiler wiring circuits.	<ol style="list-style-type: none"><li>3. Describe flame signal readings.</li><li>1. Identify components in limit circuit.</li><li>2. Identify components in pre-ignition interlock circuit.</li><li>3. Identify components in lockout circuit.</li><li>4. Identify components in modulation circuit.</li><li>5. Identify components in blower motor circuit.</li><li>6. Explain various types of pre-purge.</li><li>7. Describe operation of modulating motor and control.</li></ol>