

# Advanced Concepts of Radiographic Imaging Maintenance - Level II

Course length: 2 Weeks  
CEU's Awarded: 8

<p><b>COURSE INTRODUCTION</b> Advanced Concepts of Radiographic Imaging Maintenance- Level II is designed to teach the skills necessary to perform the advanced level maintenance of x-ray controls and the peripheral equipment found in today's diagnostic imaging systems. Hands-on emphasis is placed on calibration, evaluation and troubleshooting.</p>	<p><b>COURSE OBJECTIVES</b> At the conclusion of this course, attendees will be able to:</p> <ul style="list-style-type: none"> <li>• Determine calibration status of x-ray controls.</li> <li>• Evaluate and calibrate KV, mA, and time.</li> <li>• Evaluate and calibrate automatic exposure control circuits (AEC).</li> <li>• Perform necessary CDRH testing.</li> <li>• Troubleshoot most x-ray controls to the board or component level.</li> <li>• Troubleshoot x-ray system peripherals to the board or component level.</li> <li>• Properly install an x-ray tube.</li> </ul>	<p><b>PREREQUISITES FOR ADMISSION</b> Attendees must possess the knowledge acquired through attendance at our Fundamentals of Servicing Diagnostic Imaging Systems - Level I, or equivalent service experience, and two year electronics degree, or equivalent experience.</p>
<p><b>DAY 1</b></p> <ol style="list-style-type: none"> <li>I. Introduction</li> <li>II. Three phase x-ray control block diagram             <ol style="list-style-type: none"> <li>A. Line match and compensation</li> <li>B. KV control circuits</li> <li>C. mA control circuits</li> <li>D. Mid-secondary circuits</li> <li>E. Time control circuits</li> <li>F. Primary contactor circuits</li> <li>G. Logic control circuits</li> <li>H. Rotor controller circuits</li> <li>I. Tube protector circuits</li> </ol> </li> </ol> <p><b>LAB ACTIVITIES</b></p> <ol style="list-style-type: none"> <li>I. Circuit location and identification</li> <li>II. System operation             <ol style="list-style-type: none"> <li>A. X-ray control</li> <li>B. Table</li> <li>C. Spot device</li> <li>D. Collimator</li> <li>E. Tube hanger</li> </ol> </li> <li>III. System calibration evaluation             <ol style="list-style-type: none"> <li>A. KV</li> <li>B. mA</li> <li>C. Timer</li> <li>D. Tube protector</li> </ol> </li> </ol> <p><b>DAY 2</b></p> <ol style="list-style-type: none"> <li>I. KV control circuits block diagram             <ol style="list-style-type: none"> <li>A. Line matching</li> <li>B. Line adjust and compensation</li> <li>C. Load-on calibration</li> <li>D. No load calibration</li> <li>E. High frequency KV circuits</li> </ol> </li> </ol> <p><b>LAB ACTIVITIES</b></p> <ol style="list-style-type: none"> <li>I. KV circuits             <ol style="list-style-type: none"> <li>A. Circuit location and identification</li> <li>B. Calibration</li> <li>C. Troubleshooting</li> </ol> </li> <li>II. Use of special test equipment</li> </ol> <p><b>DAY 3</b></p> <ol style="list-style-type: none"> <li>I. KV schematic interpretation             <ol style="list-style-type: none"> <li>A. Domestic manufacturers</li> <li>B. European manufacturers</li> </ol> </li> </ol> <p><b>LAB ACTIVITIES</b></p> <ol style="list-style-type: none"> <li>I. KV circuits             <ol style="list-style-type: none"> <li>A. CDRH Compliance testing</li> <li>B. Overall troubleshooting</li> </ol> </li> </ol> <p><b>DAY 4</b></p> <ol style="list-style-type: none"> <li>I. mA control circuits             <ol style="list-style-type: none"> <li>A. Basic</li> <li>B. Saturable reactor</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>C. Mid-frequency             <ol style="list-style-type: none"> <li>1. Voltage controlled</li> <li>2. Current controlled</li> </ol> </li> <li>D. High frequency control circuits</li> <li>E. Pulse width modulated</li> <li>F. Mid secondary circuits</li> <li>G. Filament safety circuits</li> </ol> <p><b>LAB ACTIVITIES</b></p> <ol style="list-style-type: none"> <li>I. mA circuit location and identification</li> <li>II. mA control circuits calibration</li> <li>III. Use of special test equipment</li> </ol> <p><b>DAY 5</b></p> <ol style="list-style-type: none"> <li>I. mA schematic interpretation             <ol style="list-style-type: none"> <li>A. Domestic manufacturers</li> <li>B. European manufacturers</li> </ol> </li> </ol> <p><b>LAB ACTIVITIES</b></p> <ol style="list-style-type: none"> <li>I. mA circuits             <ol style="list-style-type: none"> <li>A. CDRH Compliance testing</li> <li>B. Overall troubleshooting</li> </ol> </li> </ol> <p><b>DAY 6</b></p> <ol style="list-style-type: none"> <li>I. Time control circuits             <ol style="list-style-type: none"> <li>A. Analog timers</li> <li>B. Digital timers</li> <li>C. mAs timers</li> </ol> </li> <li>II. Core memory circuits</li> <li>III. Primary contactor circuits             <ol style="list-style-type: none"> <li>A. Self commutation</li> <li>B. Forced commutation</li> </ol> </li> </ol> <p><b>LAB ACTIVITIES</b></p> <ol style="list-style-type: none"> <li>I. Time control circuits             <ol style="list-style-type: none"> <li>A. Calibration                 <ol style="list-style-type: none"> <li>1. Analog timers</li> <li>2. Digital timers</li> <li>3. mAs timers</li> </ol> </li> <li>B. Troubleshooting</li> </ol> </li> <li>II. Core memory circuits</li> <li>III. Primary contactor circuits             <ol style="list-style-type: none"> <li>A. Calibration</li> <li>B. Troubleshooting</li> </ol> </li> </ol> <p><b>DAY 7</b></p> <ol style="list-style-type: none"> <li>I. Automatic Exposure Control circuits             <ol style="list-style-type: none"> <li>A. Density tracking</li> <li>B. Density adjustments</li> <li>C. Slope adjustments</li> <li>D. Breakpoint adjustments</li> <li>E. Detectors                 <ol style="list-style-type: none"> <li>1. Ion chambers</li> <li>2. PMTs</li> <li>3. Solid state</li> </ol> </li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>II. Control logic circuits             <ol style="list-style-type: none"> <li>A. Tube protector circuits</li> <li>B. Standby circuits</li> <li>C. Pre-exposure circuits</li> <li>D. Exposure circuits</li> <li>E. Microprocessor control logic</li> </ol> </li> </ol> <p><b>LAB ACTIVITIES</b></p> <ol style="list-style-type: none"> <li>I. Automatic exposure control circuits (AEC)             <ol style="list-style-type: none"> <li>A. Density tracking run</li> <li>B. Calibration</li> <li>C. Troubleshooting</li> </ol> </li> <li>II. Control logic troubleshooting</li> <li>III. Tube protector circuits             <ol style="list-style-type: none"> <li>A. Calibration</li> <li>B. Troubleshooting</li> </ol> </li> </ol> <p><b>DAY 8</b></p> <ol style="list-style-type: none"> <li>I. Rotor controller block diagram             <ol style="list-style-type: none"> <li>A. Low speed circuits</li> <li>B. High speed circuits</li> <li>C. Brake circuits</li> </ol> </li> <li>II. X-ray tube installation             <ol style="list-style-type: none"> <li>A. New tube evaluation</li> <li>B. Mechanical mounting</li> <li>C. Maximum filament calibration</li> <li>D. Rotor controller                 <ol style="list-style-type: none"> <li>1. Programming</li> <li>2. Calibration</li> </ol> </li> <li>E. Standby calibration</li> <li>F. mA calibration</li> <li>G. Quality assurance evaluation</li> <li>H. CDRH compliance testing</li> <li>I. FDA Form 2579</li> </ol> </li> </ol> <p><b>LAB ACTIVITIES</b></p> <ol style="list-style-type: none"> <li>I. Rotor controller             <ol style="list-style-type: none"> <li>A. Calibration</li> <li>B. Troubleshooting</li> </ol> </li> <li>II. X-ray tube installation and calibration</li> </ol> <p><b>DAY 9</b></p> <ol style="list-style-type: none"> <li>I. R/F system peripherals             <ol style="list-style-type: none"> <li>A. Tables                 <ol style="list-style-type: none"> <li>1. Limits</li> <li>2. Travel</li> <li>3. Tilt</li> </ol> </li> <li>B. Spot devices                 <ol style="list-style-type: none"> <li>1. Advance</li> <li>2. Cassette positioning</li> </ol> </li> <li>C. Tube hangers                 <ol style="list-style-type: none"> <li>1. SID</li> <li>2. Controls</li> </ol> </li> <li>D. Collimators                 <ol style="list-style-type: none"> <li>1. PBL</li> <li>2. Adjustments</li> </ol> </li> </ol> </li> </ol> <p><b>LAB ACTIVITIES</b></p> <ol style="list-style-type: none"> <li>I. Overall system troubleshooting</li> </ol> <p><b>DAY 10</b></p> <ol style="list-style-type: none"> <li>I. Final exam</li> <li>II. Final exam critique</li> <li>III. Course evaluation</li> <li>IV. Parts sourcing</li> </ol>