

# Toshiba KXO 30/50 X-ray Controls Maintenance Course

Course length: 1 Week  
CEU's Awarded: 4

## COURSE INTRODUCTION

The Toshiba KXO 30 / 50 course is designed to teach the service professional those skills necessary to fully service this x-ray control. This includes all calibration procedures, functional checks, and troubleshooting techniques. The course includes integrated lectures, labs, and documentation which complement each other ensuring the maximum learning environment.

## COURSE OBJECTIVES

At the conclusion of this course, attendees will be able to:

- Troubleshoot to the component or board level.
- Calibrate all circuitry to the manufacturer's specification.
- Perform all related CDRH compliance testing.
- Verify the system performance.

## PREREQUISITES FOR ADMISSION

Attendees must possess the knowledge acquired through attendance at our Advanced Concepts of Radiographic Imaging Maintenance-Level II course or the equivalent electronics and service experience. A strong microprocessor background is recommended.

### DAY 1

- I. Introduction
- II. Console operation
  - A. Knobology
  - B. Technique selection
  - C. Dialogue display
  - D. Exposure data display
- III. Block diagram electrical operation
- IV. Cabinet layout

### LAB ACTIVITIES

- I. System operation
- II. Physical layout
  - A. Cabinet layout
  - B. Component identification
- III. Introduction to display messages
  - A. Exposure data
  - B. Dialogue data
- IV. System configuration

### DAY 2

- I. Turn on circuitry
- II. Primary switching circuitry
- III. KV control logic diagram
  - A. Line transformer
  - B. Line rectifier
  - C. Chopper control circuitry
  - D. Inverter control circuitry
    1. Pulse width modulation
    2. Short circuit protection
    3. Voltage controlled oscillator
    4. Peak value acquisition
    5. Impulse processing

### LAB ACTIVITIES

- I. KV waveform analysis
- II. KV calibration
  - A. Baseline adjustment
  - B. Maximum fluoro KV
  - C. Remote KV meter accuracy
- III. KV troubleshooting

### DAY 3

- I. Filament logic diagram
  - A. High frequency oscillator
  - B. CPU drive circuitry
  - C. Pulse width modulation circuitry
  - D. Filament feedback
  - E. Real mA feedback
  - F. Maximum filament limit
  - G. Open filament detect
  - H. Rad/fluoro switching
- II. Filament calibration
- III. HV transformer circuitry
  - A. Tube selection
  - B. HV rectification
- IV. Electronics module CPU
  - A. Interrupts
  - B. Memory and addressing
  - C. Input / output ports

### LAB ACTIVITIES

- I. mA waveform analysis
- II. mA calibration
  - A. Automatic calibration
  - B. Filament data editing
- III. Filament transformer ratio
- IV. mA troubleshooting

### DAY 4

- I. Rotor controller logic diagram
  - A. Low speed operation
  - B. High speed operation
    1. Inverter circuit
    2. Start to run switching
  - C. Control interface circuits
  - D. Brake cycle
- II. Automatic exposure control circuitry
  - A. Density control
  - B. KV compensation
  - C. PMT power supply

### LAB ACTIVITIES

- I. Rotor waveform analysis
- II. Rotor calibration
- III. AEC calibration
- IV. AEC troubleshooting

### DAY 5

- I. Console CPU
  - A. Serial communication
  - B. RAM and ROM memory
  - C. Interrupt circuitry
  - D. Real time clock circuitry
  - E. Keyboard and display control
  - F. Anatomical programming
- II. System review
- III. Final exam
- IV. Course critique