Digital Mammography: Siemens Novation DR

RADIOLOGICAL SERVICE TRAINING INSTITUTE

Introduction

Mammography may be the most dynamic of all of today's imaging modalities. With the new regulatory and accreditation procedures, and advancements in technology, the service professional is becoming more involved in maintaining the quality of the mammographic images produced. This course is designed to give the service professional the insight to evaluate image quality problems, determine if the mammographic unit is the source of the image problem and take the appropriate steps to correct the deficiency.

Given today's regulatory environment maintaining the system at peak performance is of the utmost importance. At the completion of this course students will be able to perform all Novation DR system maintenance procedures including:

- System installation
- Calibration
- Gantry maintenance
- AWS maintenance
- Imaging chain maintenance
- Detector pixel mapping
- Preventive maintenance
- Troubleshooting

Prerequisites

To attend this course, the service professional must have attended Phase I and possess fundamental knowledge and understanding of the principles of X-ray and basic electronics.

Objectives

- Identify the major components of the Novation DR system
- Describe the functional characteristics of each sub-system of the Novation DR system
- Describe the factors that affect digital mammographic image quality
- Describe how those factors are optimized to produce the highest quality digital mammographic images
- Complete all operator, administration, and application tasks
- Fully install the Novation DR system and related components
- Describe the function of the basic components of the Novation DR mammographic unit
- Perform the necessary tests to reproduce the results of the physicist's report to confirm corrective action
- Perform all system calibrations and adjustments to maintain the highest quality images and compliance with MQSA requirements
- Perform detector related maintenance and Pixel mapping procedures to maintain detector image quality over time
- Demonstrate OS competence to be able to handle AWS maintenance, backup, restore, and calibrations
- Perform complete Preventive Maintenance procedures as performed by the OEM
- Evaluate circuit functions to facilitate troubleshooting

Note: Due to copyright laws, students are required to bring to class a copy of their Technical Documentation manual. A full set of manuals is shipped with each unit, but only the following needs to be brought to class:

Example: Techn. Doc. System - SPB7-250.802.02

Course Outline

Day 1

- Course introduction
- Novation DR system
  - Components
  - Terms/acronyms
  - System documentation
  - Manual set overview
- System logins
- Mammographic regulatory overview
- Digital mammography technology overview
- Direct vs. indirect digital capture
- Digital image quality factors:
  - DQE
  - Noise/SNR
  - Contrast
  - MTF
  - Spatial resolution
- Novation quality control
- Functional checks
- Lab Activities
  - Major system component identification
  - System turn-on
  - System logins
  - System power-down

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Hands-On Training Course
Course Length: 2 Weeks
CEU's Awarded: 8 CEU's
State of Ohio Registration No. 93-09-1377T

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- Technologist QC checks
- Image quality
  - Resolution
  - Contrast
- Signal to noise
- MTF
- Flat field/Phantom IQ

- Novation DR basic operation
- Physicist evaluation testing
- Physicist evaluation corrective action
- Lab Activities
  - X-Ray to light congruence
  - kVP accuracy
  - HVL
  - AEC accuracy
  - Tube output
  - Phantom image quality
  - Signal to noise ratio (SNR)
  - Detector ghosting

Day 2

- System power
  - AWS
  - Gantry
  - Detector
  - Turn-on circuits
- System communications
  - AWS
  - Syngo computer
  - Fiber optic interface
  - Gantry
  - Detector
  - X-Ray controls
- Novation DR operations
- AWS acquisition software
- Operators console
- User interface/application
  - Image acquisition
  - Image viewer
  - Screen considerations
- Lab Activities
  - Remove and replace covers and system panels
  - Component identification
    - AWS
    - Gantry
    - Detector
  - Component location
    - Schematic location
    - Physical location
    - Connector locations
    - Fuse location/identification
  - Selecting output devices
  - Acquiring images
- Specifications
  - System specs
  - Detector specs
- Calibration overview
- System administration
- Required tools and test equipment
- Required software
- Site planning/pre-installation
- AWS configuration
- Network configuration
- Output devices
  - CDRW
  - Review station
  - PACS
  - Laser printer
  - CAD
- Device/output configuration
- Lab Activities
  - Configure AWS
  - Configure network settings
  - Configure and test output devices
  - Configure and test input devices

Day 3

- Backups
  - AWS
  - User preferences
  - Gantry/tubehead calibration data
  - Generator/AEC calibration data
- Restore system components from backup
- Operating system installation procedure
- AWS application installation procedure
- Lab Activities
  - Backup AWS
  - Backup user preferences
  - Backup gantry/tubehead calibration data
  - Backup generator/AEC calibration data
  - Complete restore from backup
  - Clean OS install
  - Application install
  - System restore from previous backup
- System service
- System calibration
  - kV regulation
  - Filament control
  - Rotor control
  - Motor controls
  - Collimator
- AEC calibration
- Digital imaging chain
- Image and detector maintenance
- Detector calibration
- Lab Activities
  - kV calibration

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- mA calibration
- Tubehead Adjustments
- AEC calibration
- Detector flat field calibration
- Pixel mapping

Day 4

- Preventive maintenance
- Review system diagrams and communication
- Review workstation utilities and service tools
- System schematics
  - AWS
  - Gantry
  - Imaging chain
- Lab Activities
  - PM worksheet
- Troubleshooting
  - Detector troubleshooting
- Error codes
  - Download error logs from generator to service laptop
- System diagnostics
- Lab Activities
  - Troubleshooting using defective/bug boards

Day 5

- Course review
- Course evaluation
- Final exam