

MRI Phase 1: Principles of Servicing MRI RSTI

RADIOLOGICAL SERVICE TRAINING INSTITUTE

Introduction

The MRI Principles course is a skills development course designed to introduce MRI service to engineers with no MRI experience. The course will equip engineers with the knowledge of the theory, safety principles and technical knowledge required for servicing MRI systems.

This course emphasizes MRI system operation and the identification of major system components in order to effect basic system repairs of the MRI system. Each day will include lab activities to support the lecture material.

Prerequisites

To attend this course, the service professional must have formal electro-mechanical and electronic/computing schooling or relevant experience.

Objectives

At the conclusion of this course participants will be able to:

- Demonstrate the theory and physics principles behind MR technology
- Demonstrate proper safety and precautionary measures when servicing MRI systems
- Perform system power-up and power-down
- Perform basic MRI system operation including image acquisition and image archival
- Identify major system components found in all MRI systems
- Understand the basic system calibrations & adjustments

- Understand system operation through block diagrams and detailed service documentation
- Perform basic system repairs

Course Outline

Day 1

- Introduction to MRI
 - What is it?
 - History of MRI Imaging
 - How it works
 - Imaging Advantages
- MRI Safety
 - Magnet Safety
 - Site Considerations
 - Cryogen Safety
 - Thermal Issues
 - Electrical/Mechanical Safety
 - Acoustic Noise
 - MR safe devices / materials
- System Architecture
 - Magnet siting requirements
 - Control Room
 - Equipment Room
 - Exam Room

Day 2

- Image Creation: RF Chain
 - RF Transmit Chain
 - RF Receive Chain
 - RF Sequence Types
 - RF Coils

Day 3

- Image Creation: Gradient Chain
 - Gradient Chain
 - Spatial Encoding

- Raw Data Collection
- Image Creation

Day 4

- System Operation: Documentation
 - System Documents (IFU)
 - System Specifications
 - Block Diagrams
 - System Logging
- System Operation: Scanning
 - Scanning Basics
 - Image Database Management
 - Image Evaluation
 - Image Analysis Tools
- MRI Tools & Test Equipment
 - Phantoms & Phantom Holders
 - RF Coils & Pads
 - Service Tools
 - Steel Hand Tools
 - Titanium Hand Tools
 - Torque Wrenches
 - Specialty Tools

Day 5

- Basic System Calibration
 - Magnet Calibrations
 - RF Chain Calibrations
 - Gradient Calibrations
 - Cooling System Calibrations
- Performance Verification
 - QA Performance Testing
 - SNR
 - Field uniformity
 - Slice thickness
 - Geometric distortion
 - Ghosting
- Course review
- Final exam