**PURPOSE:** To inform the staff of OA, State Apprenticeship Agencies (SAA), Registered Apprenticeship program sponsors and other Registered Apprenticeship partners of a revision to an existing apprenticeable occupation, Field Service Engineer (Medical).

Field Service Engineer (Medical)  
O*NET-SOC Code: 49-2094.00  
RAPIDS Code: 0916CB  
Training Term: Competency-based  
Type of Training: Competency-based

**BACKGROUND:** Michael Ferraro, Manager, Digital Imaging Technical Training at Hologic, Inc., submitted this revision for the occupation Field Service Engineer (Medical). It was approved by the OA Administrator on June 12, 2015. A Field Service Engineer (Medical) is a skilled technician who repairs, tests, adjusts, or installs electronic equipment.

**ACTION:** The OA staff should familiarize themselves with this bulletin.

If you have any questions, please contact Ricky C. Godbolt, Apprenticeship and Training Representative at (202) 693-3815.

**NOTE:** This bulletin is being sent via electronic mail.

Attachment  
- [Hologic Inc Work Process Schedule](#)
Field Service Engineering Technician Program

The Field Service Engineer (FSE) Training program provides technicians with the core fundamentals they need to perform and covers both business and technical subjects, giving apprentices an understanding of safety procedures, math, business communications, and software applications.

The FSE is responsible for installing and maintaining the systems for customers. The FSE will provide remote and onsite support and work closely with the sales and clinical team by providing troubleshooting services for the customer. The FSE shall maintain accurate documentation of all service activities and escalating issues as needed.

Major Accountabilities:

- Work closely with regional Senior Field Service Engineers to ensure local installed base is maintained to company standards and training received is sufficient
- Installation of equipment at customer’s facility to ensure full functionality according to specifications
- Provide Technical Support remotely, on-site, and via escalation management for Systems
- Provides on-site technical assistance to help troubleshoot and repair equipment. Communicate and maintain service records of performance reporting and Field Service Reports
- Communicates customer complaints to the appropriate individuals within Alcon to ensure proper recording, as per FDA requirements and company procedures
- Management of spare part and trunk inventories to ensure accurate inventory of company assets that are in the field

Apprentices in this competency-based program receive training in the classroom, on the job, in locations where the equipment they service is in use and in the manufacturing facilities where the equipment they service is manufactured. In each of these areas, individual apprentices’ evaluations and ratings are completed on a weekly basis.
At completion of the program, apprentices must be able to safely and effectively perform or demonstrate the following actions:

**Communication**
- Use professional and effective internal and external communication skills.
- Ability to diagnose issues as described over the phone by Field Service Engineers/customers

**Use of Resources**
Ability to read and understand Technical and Resource Manuals

**Mechanical**
- Safe use of hand tools
- Ability to make and complete mechanical adjustments

**Electrical/Electronics**
- Setup and use a Digital Multimeter (DMM)
- Setup and use an Oscilloscope
- Setup and use High Voltage (HV) test equipment
- Setup and use a dosimeter
- Setup and use a milliamp (mA) meter

**Circuit Theory**

**Troubleshooting**

**Networking/Connectivity**
- **Knowledge/Skills: (Not required)**
  - Technical proficiency servicing instruments in the field, and a general knowledge of corporate related processes and disciplines
  - Ability to troubleshoot complex electrical, electronic, pneumatic, and mechanical systems
• Use strong interpersonal and customer satisfaction skills.
• Function in a similar/comparable customer based laboratory environment
• Use Effective Time Management Skills.

**Computer/Software/Instrumentation:**

• Proficient use of Microsoft products (Word, Excel, Outlook)
• Working knowledge of various troubleshooting/analysis tools (Tiny Click, Macros, Data Acquisition, etc.)
• Proficient use of diagnostic instrumentation and equipment such as Digital Volt Meters (DVMs), Oscilloscopes, and Micrometers
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References:

1. MAN - 00746 Calibration and Software Maintenance Manual
2. MAN - 00746 Installation and Hardware Maintenance Manual
3. MAN - 00743 User Manual for Selenia Software
4. MAN - 01476 Quality Control Manual
5. MAN - 00477 Technologists Workbook for Selenia and SecurView
P = (Performed) S = (Simulated) O = (Observed)

*Tasks to be completed:*

**Installation**

1. **Perform Gantry Installation**  *Chapter 2 MAN-00745 Rev 3*
   
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2. **Perform Acquisition Work Station (AWS) Installation with Techmate**  *Chapter 3 MAN-00745 Rev 3*
   
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3. **Perform AWS Installation without Techmate**  *Chapter 4 MAN-00745 Rev 3*
   
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**Functional Tests**  *Chapter 5 MAN-00745 Rev 3*

1. **Identify Acquisition Station Controls and Display**
   
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2. **Perform Initial Startup Procedures**
   
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</table>
3. Perform Ground Impedance Check

4. Perform Selenia Controls and Functional Tests

Configurations Chapter 2 MAN-00746 Rev 3

1. Perform Initial Startup Procedures

2. Enter the Site Connectivity information

3. Edit the Direct Ray Operator Counsel (DROC) software configuration files

4. Configure output devices

5. Set the gain calibration life span

6. Configure the array auto-power control time
7. Configure the array temperature

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Calibrations Chapter 3 MAN-00746 Rev 3

1. Place the AWS in NON-Imaging Mode

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2. Set exposure timing parameters

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3. Perform X-Ray tube Adjustments and Calibration

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4. Perform X-Ray and light Field Compliance

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5. Perform C-Arm Tests and Adjustments

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6. **Perform Compression System Calibration**

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7. **Perform Image Receptor calibration procedures**

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8. **Modify the Tissue Exposure Control (TEC) Mode**

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9. **Perform Automatic Exposure Control (AEC) Calibration**

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10. **Perform Image Receptor Linearity**

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**Final Site Information Chapter 4 MAN-00746 Rev 3**

1. **Perform System Checkout**

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2. Perform Exposure Counter Reset

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3. Perform Collect site information

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4. Perform Backup files

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AWS Maintenance Chapter 6 MAN-00745 Rev 3

1. Identify the components that comprise of the AWS

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2. Remove the covers from the AWS

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3. Perform AWS Preventive Maintenance

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4. **Replace (3) different AWS Components**

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**Gantry Maintenance Chapter 7 MAN-00745 Rev 3**

1. **Identify the components that comprise the Gantry**

| Signature | Date | PSO |

2. **Remove the covers from the Gantry**

| Signature | Date | PSO |

3. **Perform (3) Preventive Maintenance events**

| Signature | Date | PSO |
| Signature | Date | PSO |
| Signature | Date | PSO |
4. Replace (3) different X-Ray and Imaging Components

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5. Replace (3) different Circuit boards, Firmware and Circuit components

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6. Replace (3) different Electrical Power Components and Assemblies

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7. Replace (3) different Mechanical Components and Assemblies

Write in the replaced component

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Software Maintenance Chapter 5 MAN-00746 Rev 3

1. Perform
   a. Getting log files

      | Signature | Date | P S O |
      |-----------|------|-------|

   b. Set the AWS IP Address

      | Signature | Date | P S O |
      |-----------|------|-------|

   c. Updating the default router

      | Signature | Date | P S O |
      |-----------|------|-------|

   d. Host name and aliases

      | Signature | Date | P S O |
      |-----------|------|-------|
e. Setting time, date, and time zone

f. Changing Brick and Array IP Address

g. Backup files

h. Burning Anonymous CD

i. Bad Pixel Mapping

j. Repeat Management

k. Reducing print contrast of the Laser Cameras

l. Reducing the display contrast on For Presentation Images
m. **R2 Service Utility**

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n. **Reinstalling the AWS Software**

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o. **Downloading/Initializing the Selenia Calibration Data**

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p. **Configure the Totoku display for Digital Imaging and Communication in Medicine (DICOM) Standard**

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q. **European Reference (EUREF) Test Pattern Grayscale settings**

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**Quality Control Chapter 2 and 3 MAN-01476 Rev 1**

1. Perform the following procedures as a Medical Physicist

a. **Mammographic Unit Assembly Evaluation**

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b. **Collimation Assessment**

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c. **Artifact Evaluation**

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d. **Kilovolt Peak (kVp) Accuracy and Reproducibility**

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e. **Beam Quality Assessment**

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f. **Evaluation of System Resolution**

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g. **AEC Function Performance**

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h. **Breast Entrance Exposure, Automatic Exposure Control (AEC) Reproducibility, and Average Glandular Dose (AGD)**

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i. **Radiation Output Rate**

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j. **Phantom Image Quality Evaluation**

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k. **Signal to Noise and Contrast to Noise Measurements**
1. Diagnostic Review Workstation QC

2. Perform the following procedures as a Radiologic Technologist
   a. DICOM Printer Quality Control
   b. Detector Flat Field Calibration
   c. Artifact Evaluation
   d. Signal to Noise and Contrast to Noise Measurements
   e. Phantom Image
f. Compression Thickness Indicator


signature

date

P S O

g. Diagnostic Review Workstation QC


signature

date

P S O

h. View boxes and Viewing Conditions


signature

date

P S O

i. Visual Checklist


signature

date

P S O

j. Repeat/Reject Analysis


signature

date

P S O

k. Compression


signature

date

P S O

**Operating the Application**

1. Perform Login, Logout and Shutdown Chapter 2 MAN-00743 Rev 3


signature

date

P S O

2. Using the Patient and Patient View Screens, Perform Chapter 3 MAN-00743 Rev 3

   a. Query a patient from Modality Work List (MWL) provider
b. Search a patient in local database

c. Create a new patient

d. Select an output to send images

e. Take an exposure in Manual mode

f. Take an exposure in AEC mode

g. Accept an image

h. Add a procedure to patient study

i. Non-Imaging Mode

j. Simulate Capture
3. Working with Images, Perform Chapter 4 MAN-00743 Rev 3
   
a. Preview Image
   
   b. Tools on the Preview Screen
   
   c. Accept or reject image
   
   d. Send image to output device
   
   e. Review
   
   f. Close a procedure

4. Using the Menus, Perform Chapter 5 MAN-00743 Rev 3
   
a. Main Menu functions
   
   b. Edit Menu
c. Admin Menu

5. Working with Databases, Perform **Chapter 6 MAN-00743 Rev 3**

a. Patient Demographic Information

b. Adding patients to local database

c. Searching patient data on local database

d. Edit patient data

e. Add a New Procedure to an existing patient

f. Add a new procedure to an open patient

g. Changing patient information after accepting an image
6. **Clinical Procedures, Perform** Chapter 7 MAN-00743 Rev 3

*Note: Does not require an actual patient. Breast phantom or other phantom may and should be used.*

- **a. Screening Procedure**

  Signature | Date | P S O

- **b. Working with specimens**

  Signature | Date | P S O

- **c. Accepting and storing the image**

  Signature | Date | P S O

- **d. Performing a localization procedure**

  Signature | Date | P S O

- **e. Optional Workflow Operations**

  Signature | Date | P S O

- **f. End of the day**

  Signature | Date | P S O

7. **Review and discuss with an Application Specialist the Technologist Workbook for Selenia and SecurView.**

  **Signature block to be signed by Application Specialist**

  Signature | Date
Basic Computer Usage

1. Using Terminal Window on the AWS, reboot the AWS

2. Using Terminal Window on the AWS, turn off the brick

3. Using Terminal Window on the AWS, review the taillog

4. Using Terminal Window on the AWS, review the drapi.log

5. Create a peer to peer network between the AWS and service laptop

6. Transfer file from AWS to laptop

7. Open the brick webpage

8. Open the Selenia Service Tools web page

9. Use WinFlash Array or Selenia Tools to program/upgrade the detector
**Selenia Upgrade**

1. Perform (3) Selenia Upgrades. Write in the Selenia Upgrade performed
   a. 

   

   

   

   

   Signature  Date  P S O

   b. 

   

   

   

   

   Signature  Date  P S O

   c. 

   

   

   

   

   Signature  Date  P S O

**Additional Tasks**

1. 

   

   

   

   

   Signature  Date  P S O

2. 

   

   

   

   

   Signature  Date  P S O

3. 

   

   

   

   

   Signature  Date  P S O

4. 

   

   

   

   

   Signature  Date  P S O

5. 

   

   

   

   

   Signature  Date  P S O
### Service Calls

1. Document the tasks performed during the Service Call. Include the Service Request Number.

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

2. Document the tasks performed during the Service Call. Include the Service Request Number.

   __________________________________________________________
   __________________________________________________________
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   __________________________________________________________
3. Document the tasks performed during the Service Call. Include the Service Request Number.

4. Document the tasks performed during the Service Call. Include the Service Request Number.

**Selenia Full Field Digital Mammography Unit:**
1. Perform Installation on Selenia Full Field Mammography Unit.

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2. Perform Upgrade on Selenia Full Field Mammography Unit.

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3. Perform Calibration on Selenia Full Field Mammography Unit.

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4. Perform Preventative Maintenance (PM) on Selenia Full Field Mammography Unit.

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Check List of Additional Selenia items to cover:
- Operating the Application
- AEC Calibration
- Compression Calibration
- Backup System Files
- Restore System Files
- Set the IP address
- Reinstall Application Software
- Site Connectivity including Configuration of Outputs
- Working with Images: copying from Dimension and uploading to Network File Transfer Protocol (NWKFTP) Server
- Artifact Evaluation
- Pixel Mapping
- Evaluation of System Resolution
- Signal to Noise and Contrast to Noise
- Repeat Reject Analysis
- Collimator
- Grid or Array replacement
- X-Ray tube Adjustments and Calibration
- ______________________
- ______________________
- ______________________

Service Notes:

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**Dimensions – 2D and 3D Hologic Mammography Medical Device**

1. Perform Installation on Dimension Unit

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2. Perform Upgrade on Dimension Unit

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3. Perform Calibration on Dimension Unit

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4. Preventive Maintenance (PM) on Dimension Unit

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Check List of Additional Dimension items to cover:

- Operating the Application
- AEC Calibration
- Compression Calibration
- Backup System Files
- Restore System Files
- Set the IP address
- Reinstall Application Software
- Site Connectivity including Configuration of Outputs
- Working with Images: copying from Dimension and uploading to NWKFTP Server
- Artifact Evaluation
- Pixel Mapping
- Evaluation of System Resolution
- Signal to Noise and Contrast to Noise
- Repeat Reject Analysis
- Collimator
- Grid or Array replacement
- X-Ray tube Adjustments and Calibration
- ______________________
- ______________________
- ______________________
- ______________________

Service Notes:

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Quantitative Digital Radiography (QDR) System Certification Requirements

Certification must be completed on an “A” model Discovery, Delphi, or QDR 4500. At the discretion of the facilitator, the certification process can be done individually or as part of a group. Certification should be successfully completed within 7 to 8 hours.

During the certification, you can use any materials (printed or electronic) provided to you by Hologic. You can also ask the facilitator about the system history or for technical help. The facilitator may play both the role of a customer or technical support depending upon the situation. Your interactions should be appropriate.

You will be evaluated on mechanical and electrical skills, computer and product knowledge, use of appropriate references (such as technical manuals), and interpersonal skills including customer relations. The time to complete certification, level of success, and any technical assistance you require will be considered in your evaluation.

Prior to certification, system setup by the facilitator is required. Resource requirements include laptop computer with DICOM viewer, network crossover cable, standard FE tool kit, X-ray survey meter, QDR special service tools, QDR Service Tools CD, and QDR software CD.

Certification Procedure

Please read the entire procedure before starting. Troubleshoot and resolve all problems as each problem is observed. If you need help or have a question, contact the facilitator.

1. Startup system and login.
   
   Signature Date PSO

2. Run daily Quality Control (QC) procedure.
   
   Signature Date PSO

3. Create a new patient and perform an Anterior-Posterior (AP) spine scan.
   
   Signature Date PSO

4. Verify proper image quality and correct Bone Mineral Density (BMD), Body Mass Composition (BMC), and Area.
   
   Signature Date PSO
5. Create a report and send as a DICOM report to the local host.

6. View the image on the local host using Physician's Viewer, then creates a Direct Exchange (DX) Report and prints the report.

7. Archive all scans, perform a system backup, and create an XP System Restore Point.

8. Complete and print a Field Service Report for the corrective actions performed during the certification practical as if it were an actual customer visit, using “Hologic Bedford Service Training” as the customer name.

**Fluoroscan System Requirements**

Certification must be completed on each of two systems: an InSight and a Premier. At the discretion of the facilitator, the certification process can be done individually or as part of a group. Certification on both systems should be successfully completed within 5 to 6 hours.

During the certification, you can use any materials (printed or electronic) provided to you by Hologic. You can also ask the facilitator about the system history or for technical help. The facilitator may play both the role of a customer or technical support depending upon the situation. Your interactions should be appropriate.

You will be evaluated on mechanical and electrical skills, computer and product knowledge, use of appropriate references (such as technical manuals), and interpersonal skills including customer relations. The time to complete certification, level of success, and any technical assistance you require will be considered in your evaluation.

Prior to certification, system setup by the facilitator is required. Resource requirements include laptop computer with DICOM viewer, network crossover cable, standard FE tool kit, X-ray dosimeter, Fluoroscan special service tools, Fluoroscan Service Tools CD, InSight software CD, DICOM Send option software key, and system backup media for InSight.
**Certification Procedure**

Please read the entire procedure before starting. Troubleshoot and resolve all problems as each problem is observed. If you need help or have a question, contact the facilitator.

1. Start up one system and login.

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   Signature  | Date  | P S O

2. Create a new patient and take an image.

   Signature  | Date  | P S O
   Signature  | Date  | P S O

3. Verify proper image quality.

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   Signature  | Date  | P S O

4. On the InSight system only, send and view the image on a remote computer (your laptop) using a DICOM viewer (such as Physician’s Viewer).

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5. Verify that system Millirad (mR) output does not exceed maximum specification at full power.

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6. Complete and print a Field Service Report for the corrective actions performed during the certification practical as if it were an actual customer visit, using “Hologic Bedford Service Training” as the customer name.

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7. Repeat the above steps on the second system.

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**Training Events**

Signature in the signature block indicates the apprentice discussed, performed, simulated, or observed the requirements of the entire Training Event successfully.

1. Orientation

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2. Manufacturing training Delaware

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3. Manufacturing training Connecticut

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4. Multicare Platinum training

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5. Selenia Service training

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6. **Advanced Selenia Training**

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7. **DICOM training**

   Signature  Date

8. **Image Checker training**

   Signature  Date

9. **Technical Phone Support**

   Signature  Date

10. **On-the-Job Learning**

    Signature  Date
RELATED INSTRUCTION OUTLINE
FIELD SERVICE ENGINEER (Medical)
O*NET-SOC CODE : 49-2094.00 RAPIDS CODE : 0916CB

Orientation................................................................. 24 hours

1. Hologic Organization and Culture
2. HR Benefits
3. Technical Support Overview
4. Field Service Overview
5. Travel Policy
6. IT Setup
7. OLM Training (Online Learning Management)
8. Radiation Safety
9. Expense Reports
10. eTime
11. Responsibilities of Apprentice
12. Hologic Apprentice Feedback Report

DICOM Networks for Service Engineers........................................... 54 hours

1. Hologic networking and connectivity products overview
2. DICOM and network communications theory
3. The DICOM Standard and DICOM Conformance Statements
4. Hologic and Windows software components
5. Windows power user techniques
6. Installation and setup of Hologic network components
7. Practical DICOM and network troubleshooting
8. Common problems description and resolution
9. Centralized archives
10. Workable configurations
11. Workflow considerations

Image Analytics and Image Distribution Service Training.................... 28 hours

1. System description
2. Configuration
3. Features
4. Processing
5. Workflow of all Image Analytics (ImageChecker CAD, Quantra, DigitalNow HD, BACS), Scanning Platforms (DMax, LS/LX, DM), and SecurXchange (Archive, Router) products
SV-DX and SecurXchange Router/Archive and MultiView MM......................36 hours

1. Online Dell Hardware Server Training
2. Diagnostics and trouble shooting
3. Basic connectivity as it applies to the SV-DX product line.
4. SV-DX application training.
5. Field concerns and gotchas.
7. MultiView MM components and configuration
8. Confirmation that all MultiView MM functions work in order to ensure the Apps Specialists can provide training.
9. QAWeb reinstallation and calibration settings.
10. SecurView RAID 5 configurations and disk rebuilds

Selenia Service Training.................................................................................. 60 hours

1. Describe the MQSA/ FDA/ HIPPA/ Seismic Requirements
2. Operate and configure the Selenia Dimensions system
3. Perform necessary quality control functions of the system
4. Gain internal access to the system and identify all system components
5. Gain internal access to and identify all components of the Dimensions digital detector
6. Perform appropriate system backups
7. Perform system upgrades accurate to the timing of the class
8. Perform necessary system calibrations for all aspects of operation
9. Perform AEC calibration
10. Understand image quality as it pertains to the Dimensions system
11. Configure basic DICOM connectivity of the Dimensions system
12. Install and calibrate the Affirms Breast Biopsy Guidance System
13. Access log files and troubleshoot issues
14. Perform pixel mapping for 2D and Tomo images

MultiCare Platinum......................................................................................... 56 hours

1. Describe MultiCare Platinum
2. Stereo Loc II (Analog)
3. Digital Stereo Loc II (differences only as digital is taught separately in Bedford)
4. Film Digitizer.
5. Clinical Application
6. Operation
7. Preventive Maintenance Inspections (PMIs)
8. Troubleshooting and Servicing
Dimensions Service Training

1. Describe the MQSA/ FDA/ HIPPA/ Seismic Requirements
2. Operate and configure the Selenia Dimensions system
3. Perform necessary quality control functions of the system
4. Gain internal access to the system and identify all system components
5. Perform appropriate system backups
6. Perform necessary system calibrations
7. Perform AEC calibration
8. Configure basic DICOM connectivity of the Dimensions system
9. Configure and operate the AWM workflow manager
10. Perform appropriate system backups
11. Install and calibrate the Affirm Breast Biopsy Guidance System
12. Operate and configure SecurView DX workstation
13. Access log files and troubleshoot issues

Advanced Selenia for Service Training

1. Have an in depth knowledge of how the Selenia operates.
2. Locate and understand various log files to improve/increase troubleshooting skills as it pertains to the Selenia.
3. Install Solaris 10 and apply fresh install of Selenia application on Ultra 45s.
4. Retrieve P.O.S.T. of both array and brick for diagnostic comparisons.
5. Configure MWL.
6. Configure MIMS Plus or PACS.
7. Set DICOM flags and use basic DICOM understanding to read logs and troubleshoot errors.
8. Have a better understanding of Getlogs and gain knowledge to retrieve missing or corrupt files.
9. Apply trouble-shooting methodology learned in class to reduce downtime.

Fluoroscan Systems Service Training

1. Fluoroscan system overview and maintenance philosophy
2. Function and location of system components
3. System controller components
4. C-arm components
5. System enclosure components
6. System operation
7. Operator controls and indicators
8. System theory of operation
9. System block diagram
10. System wiring diagram
11. Description of test points, board layout, basic function
12. Remove and replace system components
13. System controller
14. X-Ray controller PCB
15. Image processor PCB
16. Power supplies
17. X-ray source/high voltage power supply assembly
18. Control panel controller (or KV/filament driver assembly)
19. Collimator assembly
20. RIU or flat panel detector
21. System adjustments and calibration
22. System troubleshooting and test procedures
23. Preventative maintenance procedure
24. Spare parts lists
25. How to contact technical support

QDR Service Training .......................................................... 40 hours

1. Describe the QDR system maintenance philosophy
2. Locate and identify the function of major system components
3. Locate and describe the system operator controls
4. Operate the system software
5. Remove and replace field replaceable components
6. Perform system adjustments and calibration
7. Perform the preventative maintenance procedure
8. Describe the differences between the QDR 4500, Delphi, Discovery, and Explorer
9. Describe how to get help

Total .......................................................... 434 hours