

PART I	HAWAII HEALTH SYSTEMS CORPORATION	10.070
	STATE OF HAWAII	10.071
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		10.073

Class Specifications  
For the Classes:

BIOMEDICAL ENGINEERING TECHNICIAN SERIES  
BC-05; BC-11; BC-14; WS-14  
BU:01

BIOMEDICAL ENGINEERING TECHNICIAN I 10.070

Duties Summary:

Serves in a trainee capacity, receiving formal and on-the-job training in the principles, concepts, work processes, regulations and reference materials fundamental to the installation, repair, calibration and maintenance of biomedical equipment; and performs other related duties as assigned.

Distinguishing Characteristics:

This is the entry-level trainee level in the biomedical technician series. It involves training in the basic principles, methods and techniques of biomedical engineering, in addition to orientation relating to the objectives of the program and the organization of the department or section. Work assignments are simple, routine, and are selected and designed to develop the employee to progress to the independent worker level of the series. Primary work processes and tasks follow appropriate manufacturer standards and established guidelines. Work is critically reviewed for compliance with instructions, thoroughness and application of biomedical engineering methods and techniques and to assure potential for further training and development. As incumbent gains competence, supervision generally relaxes and the worker exercises some degree of independence.

Example of Duties:

Performs simple and routine installation, repair, calibration and periodic maintenance of biomedical equipment. Troubleshoots, identifies causes of and corrects routine malfunctioning medical equipment including electrical, electronic and mechanical features; inspects equipment on a regular basis and schedules and performs preventive maintenance; uses test equipment such as electrical safety analyzers, defibrillator energy meters, oscilloscopes and multimeters to calibrate, diagnose, test and repair equipment; uses hand and power tools such as screwdrivers, wrenches, pliers, soldering irons and power drills, etc., to repair and adjust equipment; fabricates equipment test fixtures; inspects equipment regularly and prepares records of results and any corrective action required and taken; tests patient care equipment prior to initial

use and at regular intervals and other non-patient care equipment identified as posing a possible electrical hazard during intended use; assesses what parts need to be stocked in the hospital and/or how obtained, etc.; may repair microprocessors by replacement of circuit boards; trains and instructs users including physicians and nurses in the use and care of equipment; inspects malfunctioning equipment including use, to determine whether the cause of the malfunction is related to the patient, misuse, or defective equipment; submits service requisitions, orders parts, and maintains equipment records; may work directly with manufacturer and/or manufacturer's representative.

Below is a sample list of clinical devices/equipment typically assigned:

Aspirators
Bath, Whirlpool
Blood Glucose Monitors
Camera, Video-Surgical (Endoscope,Laparoscope,Arthroscope,etc.)
Camera, Video-Surveillance
Cast Cutter Vacuum
Centrifuge
Compression Unit, Intermittent/Sequential
Heat Unit, Physical Therapy
Humidifiers, Respiratory
Irrigation Distention Systems
Lift, Patient Transfer
Light Source (Xenon, Halogen)
Lights, Surgical/Exam
Manometer, Aneroid/Digital
Monitor, Television/Video
Nebulizer
Ophthalmoscope/Otoscopes Systems
Oxygen Analyzer
Phototherapy Units/Bili-lights
Power Supplies, Electronic
Printer, Laser
Pump, Enteral Feeding
Pump, Perfusion
Recorder, Chart
Regulator/Flowmeter
Saw, Autopsy/Cast Cutter
Scale, Bed
Scale, Electronic
Smoke Evacuation Systems
Sphygmomanometer, Aneroid/Mercury
Suction Regulators
Tent, Mist/Oxygen

Thermometer, Electronic-Oral/Tympanic
Tourniquet, Pneumatic
Traction Unit
Uninterruptible Power Supply (UPS)
Warmer, Blood/Solution

Below is a sample list of radiology devices/equipment typically assigned:

Camera, ID-Radiographic
Camera, Video-Surveillance
Cast Cutter Vacuum
Monitor, Television/Video
Power Supplies, Electronic
Printer, Laser
Uninterruptible Power Supply (UPS)

Supervisory Controls: The incumbent receives specific guidance, instructions and orientation on all aspects of work during training periods. Specific and detailed instructions are given with each assignment, and follow-up is close and continuing. As incumbent's knowledge and skills increase, additional assignments characteristic of a higher level bio-medical engineering technician are made for training purposes and in preparation for advancement to the next level.

Knowledge and Abilities Required:

Knowledge of: Basic mathematical skills and/or general knowledge of biomedical engineering principles; standard methods and techniques to repair and maintain electronic and biomedical equipment; common tools; equipment and materials used in the biomedical engineering trade.

Ability to: Understand and carry out oral and/or written instructions; maintain records; get along well with others; use hand and power tools common to the trade; read and interpret sketches; manuals and other materials.

BIOMEDICAL ENGINEERING TECHNICIAN II

10.071

Duties Summary:

Serves as the sub-journey level worker that performs a variety of simple to moderately complex assignments that involves the installation, repair, calibration and periodic preventive maintenance and documentation of biomedical equipment; orders and restocks parts and supplies; may be required to pick up supplies at hardware stores; performs work as described at the next lower level and perform other duties as assigned.

Distinguishing Characteristics:

This is the sub-journey worker level in the series. The work assignments encompass problems that are simple to moderately complex, requiring the application of technical knowledge, skill and sound judgment in applying the fundamental principles, techniques, standards and guidelines of the biomedical engineering equipment services. Primary work processes and tasks follow appropriate manufacturer standards and established guidelines.

Type A: Clinical

In the clinical biomedical engineering services, assignments may be made successively to all areas of the institution. Assignments, under general supervision, involve independent responsibility to perform simple to moderately complex installations, repairs, calibrations and periodic maintenance and documentation of clinical, laboratory and surgical equipment. In addition to the simple equipment listed at the Biomedical Engineer Technician I level, the following are moderately complex equipment/devices assigned to positions at this level:

Arthroscopic Surgical Systems (camera processor, light source, drill control unit)
Autotransfusion Unit
Colposcope System
Computer, PC (Desktop,Laptop,Palmtop)
Dental Delivery Systems
Electrocardiograph, (EKG) Systems/Holter
Electrocardiograph, Cart (ECG/EKG)
Electrosurgical Unit, (ESU) Systems
Fluid Waste Management Systems
Hypo/Hyperthermia Units
Infant Care Systems-(Incubators, Radiant Warmers)
Infusion Pump, General Purpose, PCA, Syringe
Insufflators, Surgical
Lithotripter, Electronic/Ultrasonic
Microscope, Laboratory/Surgical
Modules, Physiologic Parameters (Cardiac Output, CO2, ECG, ECG Pressure, ECG/Resp, NIBP/Non-Invasive Blood Pressure, Pressure Recorder/Printer, SPO2/Pleth, Temperature
Monitor, Fetal
Monitor, Physiological-Bedside/Transport (ECG,CO2,Pressure,NIBP,Temp,Cardiac Output,CO,SPO2, Respiration, oxygen, measurement parameters)

Monitor, Vital Signs
Oxygen Concentrator
Physiologic Monitoring Systems-(Central Station Monitoring/Arrythmia Detection Systems)
Pressure Monitor, ICP/Intracranial Pressure
Printer, Video/Mavograph
Pulmonary Function Systems
Recorder, Video Tape (VCR)
Respiratory Gas Monitor
Spirometers
Table, Exam/Operating
Telemetry, Physiologic Monitoring Systems
Test Equipment (DVM, oscilloscope, patient simulator,frequency counters,power supplies & spectrum analyzers, etc...)
Treadmill Systems
Ultrasound, Physical Therapy
Video system, Surgical (Endoscopic, Hysteroscopic, Arthroscopic & Laparoscopic)

These assignments include periodic preventive maintenance inspections on assigned equipment, which are subject to periodic review for conformance with the manufacturer standards and established guidelines.

Type B: Imaging

In the imaging biomedical engineering services, assignments may be made successively to all areas of the institution. Assignments, under general supervision, involve independent responsibility to perform simple to moderately complex installations, repairs, calibrations and periodic/preventive maintenance of radiographic and diagnostic equipment. In addition to the simple equipment listed at the biomedical engineer technician I, the following are moderately complex equipment/devices to be assigned to positions at this level:

Cine Processor
Dental Delivery Systems
Film Processor, Radiographic
Injector, Contrast Media-Radiographic
Printer, Video/Mavograph
Recorder, Video Tape (VCR)
Test Equipment (DVM, oscilloscope, patient simulator,frequency counters,power supplies & spectrum analyzers, etc...)
X-Ray Film Processor Systems

These assignments are subject to periodic review for conformance with the manufacturer standards and established guidelines.

Example of Duties:

Performs simple to moderately complex installations, repairs, calibrations and periodic maintenance by troubleshooting, identifying causes of and correcting moderately difficult to complex malfunctioning medical equipment including the electrical, electronic and mechanical features; inspects equipment on a regular basis and schedules and performs preventive maintenance; uses test equipment such as electrical safety analyzers, defibrillator energy meters, oscilloscopes and multimeters to calibrate, diagnose, test and repair equipment; uses hand and power tools such as screwdrivers, wrenches, pliers, soldering irons and power drills, etc., to repair and adjust equipment; fabricates equipment test fixtures; inspects equipment regularly and maintains electronic records, stores and retrieves records of results and any corrective actions required and taken; tests all patient care equipment prior to initial use and at regular intervals and other non-patient care equipment identified as posing a possible electrical hazard during intended use; assesses what parts need to be stocked in the hospital and/or how obtained; may repair microprocessors by replacement of circuit boards; trains and instructs users including physicians and nurses in the use and care of equipment; inspects malfunctioning equipment including use, to determine whether the cause of the malfunction is related to the patient, mis-use, or defective equipment; submits service requisitions, orders parts, and maintains equipment records; works directly with manufacturer's and/or manufacturer's representative; may orient and train lower level technicians as assigned.

Supervisory Controls: Supervision received at this level is general nature, thereby requiring that assignments be performed independent of continual supervision.

Knowledge and Abilities Required:

Knowledge of: In addition to the knowledges required at the next lower level, must have knowledge of routine operations and repair of moderately complex biomedical equipment; electronic principles and theories.

Ability to: In addition to the abilities required at next lower level, must have the ability to apply the principles, theories, methods and techniques of biomedical engineering services learned to actually perform the work on 75% of the simple and moderately complex clinical or radiologic devices/equipment identified; analyze and make sound judgment as to the action to be taken; use electronic and electrical test equipment and small hand and power tools; read and interpret equipment service manuals, schematic drawings, etc., and apply them to repair situations; communicate effectively orally and in writing; and prepare routine reports.

BIOMEDICAL ENGINEERING TECHNICIAN III 10.072

Duties Summary:

Serves as the journey level worker responsible for the performance of a wide range of installations, repairs, calibrations and maintenance and documentation of complex biomedical equipment; orders and restocks parts and supplies; may supervise lower level technicians; performs work as described at the next lower levels, and performs other duties as assigned.

Distinguishing Characteristics:

This is the full performance, journey level worker in the series. Performs a wide variety of highly complex assignments, requiring the application of technical knowledge, skills and sound judgment in applying principles, techniques, standards and guidelines of the biomedical engineering equipment services. Judgement is regularly required in the selection of procedures and techniques. Assignments may include estimating budgetary requirements, maintenance of biomedical supplies and complex equipment, participating in the development of policies, standards, objectives and quality assurance for biomedical services, electronic recording, storing and retrieval of records of results and any corrective actions required and taken.

A position at this level works under minimal supervision and work processes and tasks follow manufacturer standards and guidelines. May supervise assign, inspect and review the work of lower level technicians.

Type A: Clinical

In the clinical biomedical engineering services, assignments may be made successively to all areas of the institution. In addition to the simple and moderately complex equipment listed at the Biomedical Engineering Technician I and II level, assignments involve responsibility for highly complex installations, repairs and calibration and periodic maintenance of clinical equipment such as:

Anesthesia Gas delivery Systems (Gas Machines, vaporizers, ventilator, monitors)
Cataract Extraction/Phaco System
CPAP/BIPAP Ventilatory Assist Device
Defibrillator/Monitor/Pacemaker/AED Unit
EEG/Electroencephalographic Systems
Heart/Lung Bypass Systems
Intra Aortic Balloon Pump-IABP
Laboratory Instrumentation Systems (blood gas monitors, co-oximeters, hematology systems, etc...)
Laser, Surgical

Monitor, Anesthetic Gas
Networking Device Systems (Routers, switches, hubs, repeaters, bridges, etc...)
Pacemaker, Cardiac
Scopes, Surgical Rigid/Flexible
Telemedicine Systems
Ventilator, Anesthesia
Ventilator, Portable (Adult-Neonatal)

These assignments include periodic/preventive maintenance inspections on assigned equipment and are subject to periodic review for conformance with the manufacturer standards and established guidelines.

### Type B: Imaging

In the imaging biomedical engineering services, assignments may be made successively to all areas of the institution. In addition to the simple and moderately complex equipment listed at the Biomedical Engineering Technician I and II level, assignments involve responsibility for highly complex installations, repairs and calibration and periodic maintenance of radiologic equipment/devices such as:

Cardiac Catheterization (Cath Lab) /Angiographic Systems (Angio)
Computed Tomography (CT) System, Scanner
Computerized Radiography Systems (CR)
Linear Accelerator-Radiographic Systems
Magnetic Resonance Imaging (MRI), Scanner
Networking Device Systems (Routers, switches, hubs, repeaters, bridges, etc...)
Nuclear Medicine Systems
Radiographic, Portable/Mobile Systems
Radiographic/Fluoroscopic Systems/C-Arm
Telemedicine Systems
Teleradiology Radiography Systems
Ultrasound System, Diagnostic

These assignments are subject to periodic review for conformance with the manufacturer standards and established guidelines.

### Example of Duties:

Performs highly complex installations, repairs, calibrations and periodic maintenance by troubleshooting, identifying causes of and correcting highly complex malfunctioning medical equipment including the electrical, electronic and mechanical features; inspects equipment on a regular basis and schedules and performs preventive maintenance; uses test equipment such as electrical safety analyzers, defibrillator energy meters,



oscilloscopes and multimeters to calibrate, diagnose, test and repair equipment; uses hand and power tools such as screwdrivers, wrenches, pliers, soldering irons and power drills, etc., to repair and adjust equipment; fabricates equipment test fixtures; inspects equipment regularly; tests all patient care equipment prior to initial use and at regular intervals and other non-patient care equipment identified as posing a possible electrical hazard during intended use; assesses what parts need to be stocked in the hospital and/or how obtained, etc.; repairs microprocessors by replacement of circuit boards; trains and instructs users including physicians and nurses in the use and care of equipment; inspects malfunctioning equipment including use, to determine whether the cause of the malfunction is related to the patient, mis-use, or defective equipment; submits service requisitions, orders parts and maintains equipment; electronically records, stores and retrieves records of results and of any corrective action required and taken; works directly with manufacturer's and/or manufacturer's representative.

Supervisory Controls: Supervision received at this level is minimal, thereby requiring the assignments be performed independently. May provide supervision over lower level technicians.

Knowledge and Abilities Required:

Knowledge of: In addition to the knowledges required at the next lower level, work at this level requires a thorough knowledge of the methods and techniques in the biomedical engineering services and functions of different types of clinical and imaging equipment in a hospital.

Ability to: In addition to the abilities required at the next lower level, work at this level requires the ability to perform the work on 95% of the simple, moderate and complex clinical or radiologic devices/equipment identified.

BIOMEDICAL ENGINEERING TECHNICIAN IV

10.073

Duties Summary:

Supervises and performs a wide range of installations, repairs, calibrations and periodic/preventive maintenance and documentation of complex biomedical equipment; plans, directs, inspects, and reviews the work performed by lower level technicians as the working supervisor; trains and assists in the development of subordinates; orders and restocks parts and supplies; and performs other duties as assigned.

Distinguishing Characteristics:

Supervises lower level biomedical engineering technicians and performs a wide variety of highly complex assignments, requiring the application of technical knowledge, skills and sound judgment in applying principles, techniques, standards and guidelines of the biomedical engineering equipment services. Assignments include estimating budgetary

requirements, maintenance of biomedical supplies and equipment, participating in the development of policies, standards, objectives and quality assurance for biomedical services, electronic recording, storing and retrieving records of results and any corrective actions required and taken.

A position at this level works under general or administrative supervision. Judgment is regularly required in the selection of procedures and techniques. Work processes and tasks follow manufacturer standards and guidelines. Assigns, schedules, inspects and reviews the work of lower level technicians on a daily basis.

Example of Duties:

Supervises and performs highly complex installations, repairs, calibrations and periodic maintenance by troubleshooting, identifying causes of and correcting highly complex malfunctioning medical equipment including the electrical, electronic and mechanical features; inspects equipment on a regular basis and schedules and performs preventive maintenance. Plans, directs, inspects and reviews work performed by lower level personnel. Uses test equipment such as electrical safety analyzers, defibrillator energy meters, oscilloscopes and multimeters to calibrate, diagnose, test and repair equipment; uses hand and power tools such as screwdrivers, wrenches, pliers, soldering irons and power drills, etc., to repair and adjust equipment; fabricates equipment test fixtures; inspects equipment regularly and prepares records of results and any corrective actions required and taken; tests all patient care equipment prior to initial use and at regular intervals and other non-patient care equipment identified as posing a possible electrical hazard during intended use; assesses what parts need to be stocked in the hospital and/or how obtained, etc.; repairs microprocessors by replacement of circuit boards; trains and instructs users including physicians and nurses in the use and care of equipment; inspects malfunctioning equipment including use, to determine whether the cause of the malfunction is related to the patient, mis-use, or defective equipment; submits service requisitions, orders parts and maintains equipment; electronically records, stores and retrieves records of results and any corrective actions required and taken; records; works directly with manufacturer's and/or manufacturer's representative. May also serve as the sole Biomedical Engineering Technician of the facility who is responsible for providing a wide variety of biomedical services which includes responsibility for administrative duties relating to the Biomedical Engineering Program under the general supervision of a hospital manager or administrator. The sole Biomedical Engineering Technician is responsible for overseeing and inspecting the work of contracted biomedical technicians performing various services.

Supervisory Controls: Supervision received at this level is general or administrative, thereby requiring the assignments be performed independently. Provides supervision, guidance and training to lower level technicians.

Knowledge and Abilities Required:

Knowledge of: In addition to the knowledges required at the lower levels, work at this level requires a thorough knowledge of the methods and techniques in the biomedical engineering services and functions of all types of clinical and imaging equipment in a hospital.

Ability to: In addition to the abilities required at the next lower level, work at this level requires the ability to perform the work on all of the clinical or radiologic devices/equipment identified; plan, layout, assign and review the work of other biomedical engineering technicians; understand, give and follow oral and written instructions.

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This is the first class specifications for the class BIOMEDICAL ENGINEERING  
TECHNICIAN I/II/III/IV.

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VP/Director of Human Resources