AFSC 4A2X1
BIOMEDICAL EQUIPMENT TECHNICIAN

CAREER FIELD
EDUCATION AND TRAINING PLAN

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SUMMARY OF CHANGES. As a result of the Utilization and Training Workshop (U&TW) and the emerging nature of medical equipment technology advances, the Specialty Training Standard (STS) contained in this Career Field Education and Training Plan (CFETP) has significant changes to task line items, core tasks, and training proficiency codes.
# CAREER FIELD EDUCATION AND TRAINING PLAN

**BIOMEDICAL EQUIPMENT TECHNICIAN**

**AFSC 4A2X1**

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PART I

Preface

1. This Career Field Education and Training Plan (CFETP) is a comprehensive education and training document identifying life-cycle education and training requirements, training support resources, and minimum core task requirements for Biomedical Equipment technicians. The CFETP provides supervisors, trainers, and trainees a clear career path.

2. Civilians occupying associated positions will use Part II to support duty position qualification training. Civilians occupying these positions will be graduates of a DoD Biomedical Equipment Technician (BMET) training program; or be graduates of a formal civilian BMET training program; or have 2 years of field experience as a BMET. Certification as a Certified Biomedical Equipment Technician (CBET) through the AAMI Credentials Institute (ACI), as well as A+, Network+ and Security+ are highly recommended.

3. The CFETP consists of two parts. Supervisors use both parts to plan, manage, and control training within the career field.

3.1. Part I provides information necessary for overall management of the specialty.

3.1.1. Section A explains how everyone will use the plan.

3.1.2. Section B identifies career field progression information, duties and responsibilities, training strategies, and career field path.

3.1.3. Section C associates each level with specialty qualifications (knowledge, education, training, and other).

3.1.4. Section D indicates resource constraints (Examples: funds, manpower, equipment, and facilities).

3.1.5. Section E identifies transition training guide requirements for SSgt through MSgt.

3.2. Part II includes the following:

3.3. Section A identifies the Specialty Training Standard (STS) and includes duties, tasks, technical references to support training, Air Education and Training Command (AETC) conducted training, core tasks, and correspondence course requirements.

3.4. Section B contains the course objective list and training standards supervisors will use to determine if airmen satisfy training requirements.

3.5. Section C identifies a training course index supervisors can use to determine resources available to support training. Included here are both mandatory and optional courses.

3.6. Section D identifies MAJCOM-unique training requirements supervisors can use to determine additional training required for the associated qualification needs.

3.7. Section E provides guidelines for managing and documenting medical specific enlisted training.

3.8. Section F provides guidelines and examples of proper documentation of all enlisted medical personnel training.

4. Guidance provided in this CFETP will ensure individuals in this specialty receive effective and efficient training at the appropriate career point. This plan will enable leaders to train
today’s work force for tomorrow's jobs. At the unit level, supervisors and trainers will use Part II to identify, plan, and conduct training commensurate with the overall goals of this plan.

**Abbreviations/Terms Explained**

A+. Application Plus.

AAMI. Association for the Advancement of Medical Instrumentation.

AAS. Associate in Applied Science.

ACCE. American College of Clinical Engineering.

ACI. AAMI Credentials Institute.

ADA. American Dental Association.

**Advanced Training.** A formal course with training toward a technical or supervisory level Air Force Specialty Code (AFSC).

AETC. Air Education Training Command.

AETC TM. AETC Training Manager. AETC TMs are responsible for training development, implementation, and management.

AETC TPM. AETC Training Pipeline Manager. AETC TPMs are responsible for life-cycle management for AETC formal training courses.

AFCDA. Air Force Career Development Academy.

AFCFM. Air Force Career Field Manager. The Air Force focal point for the designated career field within a functional community, serves as the primary advocate for the career field, addressing issues and coordinating functional concerns across various staffs, and is responsible for the career field policy and guidance.

AF COOL. Air Force Credentialing Opportunities On-Line.

AFSCDA. Air Force Enlisted Classification Directory.

AFMRRA. Air Force Medical Readiness Agency.

AFSC. Air Force Specialty Code.

AHA. American Hospital Association.

AHA-CC. American Hospital Association Certification Center.

ANSI. American National Standards Institute.

ARC. Air Reserve Component.

ASHE. American Society for Hospital Engineering.

**CAP.** College of American Pathologists. A laboratory accrediting organization whose goal is to improve patient safety by advancing the quality of pathology and laboratory services through education, standard setting, and ensuring laboratories meet or exceed regulatory requirements. CAP accreditation is awarded upon successful completion of the inspection process.

CBET. Certified Biomedical Equipment Technician.

CCAF. Community College of the Air Force.
CCE. Certified Clinical Engineer.

CDC. Career Development Course.

CE. Civil Engineering.

CFETP. Career Field Education and Training Plan. A comprehensive multipurpose document encapsulating the entire spectrum of training in a specialty.

CFR. Code of Federal Regulations.

CGA. Compressed Gas Association.

CHTM. Certified Healthcare Technology Manager.

CIC. CCAF Instructor Certification.

CLES. Certified Laboratory Equipment Specialist.

CMRP. Comprehensive Medical Readiness Program. Recurring training necessary to maintain skills of a fully qualified individual to adequately perform the mission and related duties required in peacetime and wartime.

COL. Course Objective List. A publication, derived from the initial skills course training standard, identifying the tasks and knowledge requirements, and respective standards provided to achieve a 3-skill level in that career field.

CompTIA. Computing Technology Industry Association.

Continuation Training. Additional training exceeding requirements with emphasis on present or future duty assignments.

Core Task. Certain tasks within a specialty training standard which Air Force specialty functional managers identify as minimum qualification requirements within that Air Force specialty for a given skill level.

CRES. Certified Radiology Equipment Specialist.

CSSP. Cyber Security Service Provider (certification).

CTS. Course Training Standard.

DOD. Department of Defense.

DSN. Defense Switching Network.

DTL. Duty Task List.

EHR. Electronic Health Record.

EST. Enlisted Specialty Training. A mix of formal training (technical school) and informal training (on-the-job) to qualify and upgrade airmen in each skill level of a specialty.

GER. General Education Requirements.

HMR. Historical Maintenance Record.

HST. Home Station Training.

IEC. International Electrotechnical Commission.
IEEE. Institute of Electrical and Electronics Engineers.

Initial Skills Training. A formal school course that results in the award of a 3-skill level Air Force Specialty Code.

ISD. Instructional System Development. A deliberate and orderly process for planning and developing instructional programs to ensure personnel are taught the knowledge, skills, and attitudes essential for successful job performance.

ISO. International Organization for Standardization.

ITR. Individual Training Record.

JBSA. Joint Base San Antonio.

JQS. Job Qualification Standard.

MAJCOM. Major Command.

METC. Medical Education Training Campus. Located on Fort Sam Houston, Texas, METC conducts all medical courses of initial entry and some advanced courses, to include the BMET Basic and Advanced training courses.

MFM. Major Command Functional Manager.

MTF. Medical Treatment Facility.

MTL. Master Task List. The MTL identifies all day-to-day mission (duty position) requirements, core tasks, in-garrison and contingency tasks, and additional duties performed by work center personnel.

MTP. Master Training Plan. At a minimum, it must include the MTL, current CFETP, locally developed or electronic equivalent AF Form 797, Job Qualification Standard (JQS) Continuation Sheet (if applicable), and milestones for tasks and CDC completion (identify the projected timeframe the trainee will complete all required tasks, Home Station Training (HST), deployment/Unit Type Code (UTC) tasks, and each set of CDCs as required).

NCRP. National Council on Radiation Protection and Measurements.


OJT. On-the-Job Training. Hands-on performance, with over-the-shoulder supervision training conducted at the duty location to certify personnel in both upgrade (skill level award) and job qualification (duty position certification) training.

PACS. Picture Archiving Communication System.

POI. Plan of Instruction. A course control document used for course planning, organization, operation, and validation.

PMC. Project Management Certification.

PMI. Project Management Institute.

PMI. Patient Movement Item.
PMP. Project Management Professional.

QT. Qualification Training. Actual hands-on task performance-based training both during and after the upgrade training process which is designed to qualify an airman in a specific duty position.

QTP. Qualification Training Package. An instructional course designed for use at unit level to qualify, or aid in qualification, in a duty position or on a piece of equipment.

Resource Constraints. Resource deficiencies, such as money, facilities, time, manpower, and equipment that may prevent the desired training from being delivered.

RSNA. Radiological Society of North America.

SACS. Southern Association of Colleges and Schools.


SKT. Specialty Knowledge Tests.

SME. Subject Matter Expert.

SNCO. Senior Noncommissioned Officer.

SOW. Statement of Work.

Standard. A fixed quantity or quality such as accuracy, speed, percent/ratio, number of permissible errors and degree of excellence.

STRT. Specialty Training Requirements Team.

STS. Specialty Training Standard. An Air Force publication which is a source document for formal AFS training that describes an Air Force specialty in terms of tasks and knowledge, which an airman in that specialty may be expected to perform or to know on the job.

TFTR. Total Force Training Record.

TJC. The Joint Commission. An independent, not-for-profit organization that evaluates and accredits nearly 16,000 health care organizations and programs in the United States.

Total Force. All collective Air Force components (active, reserve, and civilian elements of the United States Air Force).

TR. Training References.

UGT. Upgrade Training. Training that leads to the award of a higher skill level in an Air Force specialty.

UL. Underwriters Laboratories.

UMD. Unit Manning Document.

UTC. Unit Type Code.

UTM. Unit Training Manager.

U&TW. Utilization and Training Workshop. A forum that the AFCFM, AETC TPM, AETC TM, MAJCOM Functional Managers (MFM), ARC personnel, and Subject Matter Experts (SME) conduct to identify the education and training needs, develop and review training
programs, resolve training or personnel utilization issues, and develop the CFETP for an Air Force Specialty.

**WAPS.** Weighted Airman Promotion System.

**Section A – General Information**

1. **Purpose.** This CFETP provides information necessary for Air Force Career Field Managers (AFCFMs), MAJCOM Functional Managers (MFM), commanders, training managers, supervisors, and trainers to plan, develop, manage, and conduct an effective career field training program. This plan outlines the training individuals in the 4A2X1 specialty must receive in order to develop and progress throughout their careers. This plan identifies initial skills, upgrade, qualification, advanced, and proficiency training. Initial skills training is the AFSC-specific training an individual receives upon entry into the Air Force or upon retraining into this specialty for award of the 3-skill level. For this career field, the Medical Education and Training Campus (METC) with instructors assigned to the 59th Training Group at Fort Sam Houston, TX provides this training.

1.1. Upgrade training identifies the mandatory courses, task qualification requirements, and correspondence course completion requirements for award of the 3-, 5-, 7-, and 9-skill levels. Qualification training is actual hands-on task performance training designed to qualify an Airman in a specific duty position. This training program occurs both during and after the upgrade training process. It is designed to provide the performance skills and knowledge required to do the job. Advanced training is formal specialty training used for selected Airmen. Proficiency training is additional training provided to personnel to increase their skills and knowledge beyond the minimum required for upgrade. The CFETP has several purposes as follows.

1.1.1. Serves as a management tool to plan, manage, conduct, and evaluate a career field training program. It also helps supervisors identify training at the appropriate point in an individual’s career.

1.1.2. Identifies task and knowledge training requirements for each skill level in the specialty and recommends education and training throughout each phase of an individual’s career.

1.1.3. Lists training courses available in the specialty, identifies sources of training, and the training delivery method.

1.1.4. Identifies major resource constraints which impact full implementation of the desired career field training process.

2. **Uses.** MFM and supervisors at all levels will use the plan to ensure comprehensive and cohesive training programs are available for each individual in the specialty.

2.1. AETC training personnel will develop/revise formal resident, non-resident, field and exportable training based on requirements established by the users and documented in Part II of the CFETP. AETC training personnel and MFM will also work with the AFCFM to develop acquisition strategies for obtaining resources needed to provide the identified training.

2.2. MFM will ensure their training programs complement the CFETP mandatory initial, upgrade, and proficiency requirements. OJT, resident training, contract training, or exportable courses can satisfy identified requirements. MAJCOM-developed training to support this AFSC must be identified for inclusion into the program.
2.3. Each individual will complete the mandatory training requirements specified in this program. The list of courses in Part II will be used as a reference to support training.

3. **Coordination and Approval.** The AFCFM is the approval authority. MAJCOM representatives and AETC training personnel will identify and coordinate on the career field training requirements. The AETC training manager for this specialty will initiate an annual review of this document by AETC and MFMs to ensure currency and accuracy. Using the list of courses in Part II, AETC and MFMs will eliminate duplicate training.

**Section B – Career Progression and Information**

1. **Specialty Descriptions**

1.1. **Specialty Summary.** Installs, inspects, repairs, and modifies biomedical equipment and support systems. Performs pre-purchase evaluations of medical devices and advises on operational theory, underlying physiological principles, and safe clinical applications of biomedical equipment. Implements organizational maintenance support for all medical devices used within the medical treatment facility (MTF), medical research laboratories, air transportable hospitals and clinics, and contingency hospitals. Provides technical guidance and intermediate maintenance support on medical equipment systems when assigned to a regional maintenance activity. Related DoD Occupational Subgroup: 132600.

1.2. **Assembles, installs, and inspects new biomedical equipment.** Assembles equipment and conducts pre-operational tests to verify compliance with medical and technical standards, specifications, contracts, and regulatory guidance. Installs or coordinates the installation of medical equipment that requires interface with other devices or with the facility. Resolves installation and associated maintenance support problems. Performs formal acceptance testing of complex medical equipment and installations such as diagnostic radiology systems and physiological monitoring systems. Performs pre-procurement surveys, and provides technical advice regarding the purchase of new biomedical equipment systems and the required facility interface requirements.

1.3. **Inspects, services, and modifies biomedical equipment and support systems.** Inspects biomedical equipment systems to determine operational status and compliance with technical standards and specifications. Performs or supervises preventive maintenance tasks such as lubrication; mechanical adjustment; and replacement of filters, tubing, and other parts subject to deterioration. Evaluates user maintenance procedures and ensures safe medical equipment practices are exercised. Instructs and advises personnel in the care and safe, effective use of medical equipment. Calibrates medical equipment according to manufacturers' technical literature, pertinent federal regulations, national standards, state and local laws, and Air Force guidance. Applies electrical, electronic, optical, mechanical, pneumatic, hydraulic, and physiological principles to diagnose and locate system malfunctions. Uses test equipment, technical data, engineering drawings, schematics, and reference materials for troubleshooting and repair of medical equipment. Performs authorized modifications to biomedical equipment.

1.4. **Performs safety inspections.** Inspects and tests medical and patient-related non-medical equipment for compliance with current safety standards. Inspects and tests supporting utility systems and specialized environment control systems of the medical facility for compliance with electrical and patient safety codes and standards. Identifies deficient equipment, initiates corrective action, and informs personnel of possible safety hazards.
1.5. **Performs maintenance management and administrative functions.** Develops and directs methods and procedures to be used in the maintenance activity. Determines the type, extent, and feasibility of repairs; and implements repair or disposition procedures. Performs tasks relating to collecting and recording historical maintenance data. Quality control reports to ensure accuracy of bench stock balance records and historical maintenance reports (HMRs). Schedules preventive maintenance and calibration cycles based on Air Force regulations, manufacturers' literature, and local conditions. Administers the medical equipment warranty and guarantee program. Develops statements of work (SOWs) and manages the medical equipment contract maintenance program. Ensures availability and control of spare parts, test equipment, and tools.

2. **Specialty Qualification:**

2.1. **Knowledge.** Knowledge is mandatory of physiology; electrical, electronic, mechanical, optical, hydraulic, pneumatic, and radiation principles that apply to biomedical equipment systems; using and interpreting national safety and accrediting standards, blueprints, and Air Force publications; equipment systems application in medicine; and medical safety procedures.

2.2. **Education.** For entry into this specialty, completion of high school or general educational development equivalency with courses in algebra, trigonometry, mechanics, mechanical theory, general sciences, anatomy, or biology is desirable.

2.3. **Training.** For award of AFSC 4A231, completion of the basic biomedical equipment maintenance course is mandatory.

2.4. **Experience.** The following experience is mandatory for award of the AFSC indicated:

2.4.1. **4A251.** Qualification in and possession of AFSC 4A231. Also, experience in functions such as installing, inspecting, calibrating, modifying, and repairing biomedical equipment support systems.

2.4.2. **4A271.** Qualification in and possession of AFSC 4A251. Also, experience supervising functions such as installing, calibrating, repairing, or modifying biomedical equipment systems.

2.4.3. **4A291.** Qualification in and possession of AFSC 4A271. Also, experience managing functions such as installing, calibrating, repairing, or modifying biomedical equipment systems.

2.5. For entry into this specialty: Members must meet minimum aptitude scores in the following areas: Mechanical (M=60) and Electronic (E=70), and Prospective students must meet the Strength Aptitude by demonstrating a weight lift of 50lbs (X=H), and a minimum Physical Profile Assessment: P=2, U=2, L=2, H=3, E=3, S=1. For award and retention of AFSCs 4A231/51/71/91/00, must maintain an Air Force Network License to utilize IT resources for daily operations.

3. **Skill/Career Progression.** It is essential that everyone involved in training do their part to plan, develop, manage, conduct, and evaluate an effective training program. The guidance provided in this part of the CFETP will ensure individuals receive viable training at the appropriate points in their career. The following narrative and AFSC 4A2X1 career field flowcharts identify the training career path. It defines the training required in an individual's career.

3.1. **Apprentice (3) Level.** The specialty consists of the tasks and knowledge training provided in the 3-skill level resident course (L5ABJ4A231 00AA, PDS code U10) located at Fort Sam
Houston, Texas. Initial skills training requirements are driven by the Specialty Training Standard (STS) within this CFETP. The STS was developed from data collected from the Occupational Survey Report. All Individuals must complete the initial skills course to be awarded AFSC 4A231.

3.2. **Journeyman (5) Level.** This specialty has a 5-skill level awarding Career Development Course (CDC). Qualification at the 5-skill level is awarded only after successful completion of the CDC, on-the-job training, or granted a waiver by the 4A2 Career Field Manager and recommended by the supervisor.

3.3. **Craftsman (7) Level.** This specialty has a 7-skill level awarding CDC. Qualification of the 7-level is awarded upon successful completion of the CDC, on-the-job training, and recommended by the supervisor. Supplemental and commercial courses are desirable. Knowledge of Air Force property, resource protection, and accountability of Air Force property is mandatory. Knowledge of data automation systems procedures is desirable.

3.4. **Superintendent (9) Level.** To be awarded AFSC 4A291, an individual must be an E-8.

4. **Training Decisions.** This CFETP includes life cycle training requirements for this specialty. Included in this spectrum is the strategy of when, where, and how to meet these training requirements. The strategy must be apparent and affordable to reduce duplication and eliminate a fragmented approach to training.

4.1. **Initial Skills Training.** The initial skills course provides training needed to prepare graduates for their first duty station assignment as a Biomedical Equipment Technician Apprentice.

4.2. **Upgrade Training.** Upgrade training is accomplished through completion of the CDC and continuous on-the-job training. Upgrade training is the responsibility of the trainee, trainer, supervisor, and manager at all levels. Failure to satisfactorily progress is cause for decertification, demotion, and separation from the Air Force.

4.2.1. The 4A251 CDC is designed to educate the Biomedical Equipment Technician Apprentice in biomedical equipment principles and equipment systems.

4.2.2. The 4A271 CDC is designed to educate the Biomedical Equipment Technician Journeyman in various management and supervisory tasks required of the craftsman position.

5. **Community College of the Air Force (CCAF).** CCAF is one of several federally chartered degree-granting institutions; however, it is the only 2-year institution exclusively serving military enlisted personnel. The college is regionally accredited through Air University by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS) to award Associate in Applied Science (AAS) degrees designed for specific Air Force occupational specialties and is the largest multi-campus community college in the world. Upon completion of basic military training and assignment to an Air Force career field, all enlisted personnel are registered in a CCAF degree program and are afforded the opportunity to obtain an AAS degree. In order to be awarded the degree, personnel must successfully complete the degree requirements before separating, retiring, or is commissioned as an officer. See the CCAF website or local education office for details regarding the AAS degree programs.

5.1 **Degree Requirements.** The most recent requirements can be found on the CCAF website or through the local education office.
5.2 Professional Certifications. Certifications assist the professional development of Airmen by broadening their knowledge and skills. Additionally, specific certifications may be awarded collegiate credit by CCAF and civilian colleges. To learn more about professional certifications and certification programs offered by CCAF, see the CCAF website. In addition to its associate degree program, CCAF offers the following certification programs and resources:

5.2.1. CCAF Instructor Certification (CIC) Program. CCAF offers the three-tiered CIC Program for qualified instructors teaching at CCAF affiliated schools who have demonstrated a high level of professional accomplishment. The CIC is a professional credential that recognizes the instructor's extensive faculty development training, education and qualification required to teach a CCAF course, and formally acknowledges the instructor's practical teaching experience. Qualified officer, enlisted, civilian and other service instructors are eligible for this certification.

5.2.2. CCAF Instructional Systems Development (ISD) Certification Program. CCAF offers the ISD Certification Program for qualified curriculum developers and managers who are formally assigned at CCAF affiliated schools to develop and manage CCAF collegiate courses. The ISD Certification is a professional credential that recognizes the curriculum developer’s or manager’s extensive training, education, qualifications and experience required to develop and manage CCAF courses. The certification also recognizes the individual’s ISD qualifications and experience in planning, developing, implementing and managing instructional systems.

5.2.3. Air Force Credentialing Opportunities On-Line (AF COOL). AF COOL replaced the CCAF Credentialing and Education Research Tool (CERT). The AF COOL Program provides a research tool designed to increase an Airman’s awareness of national professional credentialing and CCAF educational opportunities available for all Air Force Occupational specialties. AF COOL also provides information on specific occupational specialties, civilian occupational equivalencies, CCAF degree programs, AFSC-related national professional credentials, credentialing agencies, and professional organizations. AF COOL contains a variety of information about credentialing and licensing and can be used to get background information about civilian licensure and certification in general and specific information on individual credentials including eligibility requirements and resources to prepare for an exam; identify licenses and certifications relevant to an AFSC; learn how to fill gaps between Air Force training and experience and civilian credentialing requirements; get information on funding opportunities to pay for credentialing exams and associated fees; and learn about resources available to Airmen that can help them gain civilian job credentials.

5.3. Civilian Certification. While highly encouraged, not all civilian certification is mandatory.

5.3.1. Biomedical Certifications. The AAMI credentials institute (ACI) provides certification for biomedical Equipment technician (CBET), Certified Healthcare Technology Manager (CHTM), and Certified Radiology Equipment Specialist (CRES). The ACI also offers a candidacy program that permits course graduates to take the written examination while obtaining the required work experience for full standing as a CBET.

5.3.2. Computer Systems Certifications. Certifications in computer systems area such as A+, Net +, and Security + are offered through CompTIA.

5.3.3. Clinical Engineer Certification. The American College of Clinical Engineering (ACCE) offers the Certified Clinical Engineer (CCE).

5.3.4. Project Management Certifications. The Project Management Institute (PMI) offers
certification as a Project Management Professional (PMP).

6. **Enlisted Force Development.** A chart depicting the Biomedical Equipment Technician development pathway is presented below in figure 6.1 and outlines when training is required for each skill level and function within this specialty. Average promotion times for active duty are listed in figure 6.2.

6.1. **Air National Guard and Air Force Reserves.** The enlisted education and training path for ANG and AFRES shadows the active duty requirements for the ranks of SrA and below. The ranks SSgt to MSgt are achieved through the availability of authorized positions on the unit manning document (UMD). Personnel may have the opportunity to receive a promotion one grade above the authorized position designated on the UMD. At this time, there are no authorized ANG nor AFRES positions for the ranks SMSgt and CMSgt.
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| - Must be a SrA with 48 months’ time-in-service or SSgt selectee.  
- Resident graduation is a prerequisite for SSgt sew-on (Active Duty Only). |      |                |                |
| Upgrade To Craftsman (7-Skill Level) |      |                |                |
| - Minimum rank of SSgt.  
- Complete appropriate CDC.  
- Complete appropriate core tasks. | SSgt | 4 years        | 3 years        |
| Noncommissioned Officer Academy (NCOA) |      |                |                |
| - Must be a TSgt or TSgt selectee.  
- Resident graduation is a prerequisite for MSgt sew-on (average 14 years, earliest 8 years) (Active Duty Only). | TSgt | 9 years        | 5 years        |
| USAF Senior NCO Academy (SNCOA)    |      |                |                |
| - Must be a SMSgt, SMSgt selectee or a MSgt who has been selected to attend based on promotion scores.  
- Resident graduation is a prerequisite for CMSgt sew-on (Active Duty Only). | SMSgt | 17 years       | 11 years       |
| Upgrade To Superintendent (9-Skill Level) |      |                |                |
| - Minimum rank of SMSgt.            | CMSgt | 22 years       | 14 years       |
| Trainer                             |      |                |                |
| - Qualified to perform task to be trained  
- Must attend AF Training Course and be appointed by Commander  
- Recommended by supervisor. |      |                |                |

Figure 6.2, enlisted career path
Section C – Skill Level Training Requirements

1. Purpose. Skill levels in this career field are defined in terms of tasks and knowledge requirements. This section outlines the specialty qualification requirements for each skill level in broad, general terms, and establishes the mandatory requirements for entry, award, and retention of each skill level.

2. Specialty Qualifications.

2.1. Apprentice Level Training.

2.1.1. Knowledge. Knowledge is mandatory of medical maintenance procedures, general characteristics of biomedical equipment sections, and organization of medical units. Knowledge is desirable of operating automated data processing equipment, test equipment, computer terminals, management, and data automation.

2.1.2. Education. Completion of high school or general educational development equivalency with courses in algebra, trigonometry, mechanics, mechanical theory, general sciences, anatomy, or biology is desirable.

2.1.3. Training. Completion of the basic DOD Biomedical Equipment Technician training program is mandatory for the award of this AFSC.

2.1.4. Other Requirements. Requirements are listed in the latest Air Force Enlisted Classification Directory (AFECD).

2.2. Journeyman Level Training.

2.2.1. Knowledge. Knowledge is mandatory of physiology, electrical, electronic, mechanical, optical, hydraulic, pneumatic, and radiation principles that apply to biomedical equipment and support systems; using and interpreting schematics; technical specification data; accepted national safety and accrediting standards, blueprints, and Air Force publications; equipment systems application in medicine; and medical safety procedures.

2.2.2. Education. Completion is desirable of high school courses in management, algebra, trigonometry, basic electronic data processing, electronics, chemistry, physics, bookkeeping and accounting, and business administration.

2.2.3. Training. Completion of the Biomedical Equipment Technician training program at METC is mandatory. Qualification at the 5-skill level is awarded only after successful completion of the 4A251A and 4A251B CDC and required core tasks.

2.2.4. Experience. Qualification in and possession of AFSC 4A231. Experience in functions such as installing, inspecting, calibrating, modifying, and repairing biomedical equipment support systems. The supervisor must recommend the individual for upgrade.

2.3. Craftsman Level Training.

2.3.1. Knowledge. Knowledge is mandatory of biomedical equipment maintenance procedures, general characteristics of biomedical equipment sections, organization of medical units, maintenance management, MTF accreditation, and inspection requirements. A strong background in physiology, electrical, electronic, electromechanical, mechanical, optical, hydraulic, pneumatic, and radiation principles that apply to biomedical equipment support systems; using and interpreting national safety and accrediting standards, blueprints, schematics,
and Air Force publications; equipment systems application in medicine; and medical safety procedures. Advanced knowledge is desirable of operating automated data processing equipment, test equipment, computer terminals, computer/systems management, data automation, networks and software.

2.3.2. Education. Completion is desirable of college courses in management, college algebra, basic electronic data processing, electronics, chemistry, physics, bookkeeping and accounting, and business administration. An Associate degree in Biomedical Equipment Technology is highly recommended. Continuing education should be provided through the Association for the Advancement of Medical Instrumentation (AAMI), the Radiological Society of North America (RSNA), through the American Society for Hospital Engineering (ASHE), CompTIA.

2.3.3. Training. Completion of the basic Biomedical Equipment Technician training program is mandatory for the award of this AFSC. Completion of the 4A271 CDC is mandatory. Completion of Air Force supplemental BMET training program advanced/supplemental courses and commercial courses are highly recommended and should be aggressively pursued. Certification through the ACI, CompTIA and computer systems certifications are highly encouraged.

2.3.4. Experience. Qualification is mandatory as a Biomedical Equipment Technician Journeymen. Also, experience is mandatory in performing functions such as installing, calibrating, repairing, or modifying biomedical equipment and support systems. The supervisor must recommend the individual for upgrade.

2.4. Superintendent Level Training.

2.4.1. Knowledge. Knowledge is mandatory of biomedical equipment maintenance procedures, general characteristics of biomedical equipment sections, maintenance management, organization of medical units, MTF accreditation, and inspection requirements. A strong knowledge of physiology, electrical, electronic, electromechanical, mechanical, optical, hydraulic, pneumatic, radiation principles (applicable to biomedical equipment systems), using and interpreting national safety and accrediting standards, blueprints, schematics, Air Force publications, biomedical equipment systems application in medicine, and medical safety procedures. Advanced knowledge is desirable in the operation of automated data processing equipment, test equipment, computer terminals, management, data automation, networks and software.

2.4.2. Education. An associate degree is required. Completion of college courses in management, algebra, basic electronic data processing, electronics, chemistry, physics, bookkeeping and accounting, and business administration is desirable. A Bachelor’s degree in related areas of study is highly recommended.

2.4.3. Training. Completion of the DOD Biomedical Equipment Technician training program is mandatory for the award of this AFSC. Completion of a computer repair course is desirable. Completion of Air Force supplemental Biomedical Equipment Technician courses and commercial courses is highly recommended and should be aggressively pursued.

2.4.4. Experience. Qualification is mandatory as a Biomedical Equipment Technician Supervisor and Biomedical Equipment Craftsman. Experience is also mandatory in managing and directing all biomedical equipment functions.

2.4.5. Promotion to SMSgt is mandatory.
2.5. **Chief Enlisted Manager (CEM) 4A200.** Awarded after promotion to Chief Master Sergeant. A CEM can expect to fill positions such as functional manager at various command levels, squadron superintendent, and flight chief. Additional training in the areas of resources, leadership skills, and management should continue. Completion of higher degree programs is highly recommended.

Section D – Resource Constraints

1. **Purpose.** This section identifies known resource constraints, which preclude optimal/desired training from being developed or conducted, including information such as cost and manpower. Narrative explanations of each resource constraint and an impact statement describing what effect each constraint has on training are included. Also included in this section are actions required, office of primary responsibility, and target completion dates. Resource constraints will be, as a minimum, reviewed and updated annually.

2. **Apprentice (3-Level) Training.** There are no resource constraints.

3. **Journeyman (5-Level) Training.** Consolidated storage locations of WRM assets and TDY funding constraints limit access for task certification training.

4. **Craftsman (7-Level) Training.** There are no resource constraints.

Section E – Transitional Training Guide

There is currently no requirement for a transitional training guide. This area reserved.

PART II

Section A – Specialty Training Standard (STS) explanation

1. **Implementation.** The STS in this CFETP is correlated with training provided by METC for the 3-skill level apprentice course-L5ABJ4A231 00AA.

2. **Purpose of the STS and explanation of columns.**

   2.1. Column 1 (Task, Knowledge, and Technical Reference) lists the most common tasks, knowledge, and technical references (TR) necessary for Airmen to perform duties in the 3-, 5-, and 7-skill level.

   2.2. Column 2 (Core Tasks) identifies specialty-wide training requirements for the 5 and 7 skill levels, and if the task has to be certified when signed off (indicated by “^”).

   2.3. Column 3 provides certification for OJT and is used to record completion of tasks and knowledge training requirements. Use the automated Total Force Training Record (TFTR) to formally document technician qualifications.

   2.4. Column 4 shows formal training and correspondence course requirements.

   2.4.1. Column 4A is used to indicate the level of training and knowledge provided by resident 3-skill level training in the BMET Basic Course.

   2.4.2. Column 4B and 4C are used to indicate level of training and knowledge provided during upgrade training for the 5 and 7-skill level respectively.

2.5. **Qualitative Requirements.** The proficiency code key is on the page before the STS and is used to indicate the level of training and knowledge provided by resident training and OJT. Also on this page is a section for identification of the trainee and certifying officials.
2.6. **Training responsibilities.** See DAFI 36-2670, *Total Force Development*, for details regarding responsibilities for developing and conducting training.

2.7. The STS is a guide for development of promotion tests used in the Weighted Airman Promotion System (WAPS). Specialty Knowledge Tests (SKTs) are developed at the AETC Airman Advancement Division by senior NCOs with extensive practical experience in their career fields. The tests sample knowledge of STS subject matter areas judged by test development team members as most appropriate for promotion to higher grades. Questions are based upon study references listed in the Enlisted Promotions References and Requirements Catalog (EPRRC). Examinee responsibilities are listed in paragraph 4.2.15 of AFMAN 36-2664, *Personnel Assessment Program*.

3. **Recommendations.** Identify inadequacies and recommend changes to this training standard through channels at 59 TRG/TGE, 2931 Harney Rd, JBSA Fort Sam Houston, Texas 78234-7674 or use the Customer Service Information Line (CSIL) (DSN) 420-1080, (Commercial) 210-808-1080 to report your findings.

**BY ORDER OF THE SECRETARY OF THE AIR FORCE**

**OFFICIAL**

ROBERT I. MILLER  
Lieutenant General, USAF, MC, SFS  
Surgeon General

Attachment  
STS: Biomedical Equipment Technician Specialty (4A2X1)
## Qualitative Requirements

### Proficiency Code Key

<table>
<thead>
<tr>
<th>Scale Value</th>
<th>Definition: The individual</th>
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<tbody>
<tr>
<td><strong>Task Performance Levels</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Can do simple parts of the task. Needs to be told or shown how to do most of the task. (Extremely Limited)</td>
</tr>
<tr>
<td>2</td>
<td>Can do most parts of the task. Needs only help on hardest parts. (Partially Proficient)</td>
</tr>
<tr>
<td>3</td>
<td>Can do all parts of the task. Needs only a spot check of completed work. (Competent)</td>
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<tr>
<td>4</td>
<td>Can do the complete task quickly and accurately. Can tell or show others how to do the task. (Highly Proficient)</td>
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<tr>
<td><strong>Task Knowledge Levels</strong></td>
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<tr>
<td>a</td>
<td>Can name parts, tools, and simple facts about the task. (Nomenclature)</td>
</tr>
<tr>
<td>b</td>
<td>Can determine step by step procedures for doing the task. (Procedures)</td>
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<tr>
<td>c</td>
<td>Can identify why and when the task must be done and why each step is needed. (Operating Principles)</td>
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<tr>
<td>d</td>
<td>Can predict, isolate, and resolve problems about the task. (Advanced Theory)</td>
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<tr>
<td><strong>Subject Knowledge Levels</strong></td>
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<tr>
<td>A</td>
<td>Can identify basic facts and terms about the subject. (Facts)</td>
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<tr>
<td>B</td>
<td>Can identify relationship of basic facts and state general principles about the subject. (Principles)</td>
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<tr>
<td>C</td>
<td>Can analyze facts and principles and draw conclusions about the subject. (Analysis)</td>
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<tr>
<td>D</td>
<td>Can evaluate conditions and make proper decisions about the subject. (Evaluation)</td>
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### Explanations

* A task knowledge scale value may be used alone or with a task performance scale value to define a level of knowledge for a specific task. (Example: b and 1b)

** A subject knowledge scale value is used alone to define a level of knowledge for a subject not directly related to any specific task, or for a subject common to several tasks.

^ This mark is used in column 2 to indicate the task has to be certified when signed off.

- This mark is used alone instead of a scale value to show that no proficiency training is provided in the course or CDC.

X This mark is used alone in the course columns to show that training is required but not given due to limitations in resources.

### Notes:

-- All tasks and knowledge items shown with a proficiency code are trained during war time.
-- Column 2 Core tasks, when this includes the numbers 5 or 7, this task is a requirement for 5-skill level or 7-skill level upgrade respectively.
## 1. CAREER LADDER PROGRESSION

### 1.1. Airmen career ladder and educational opportunities

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<th>Task</th>
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### 1.2. Progression in career ladder 4A2X1

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### 1.3. Individual AFSCs for 4A2 (4A211, 4A231, 4A251, 4A271, 4A291, and CEM Code 4A200)

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<th>Task</th>
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### 1.4. USAF/DHA medical service

#### 1.4.1. Mission

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#### 1.4.2. Organization

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#### 1.4.3. Function

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## 2. PROFESSIONAL AND PATIENT RELATIONSHIPS

### 2.1. Professional relations with patients, customers, and medical staff

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### 2.2. Professional standards of ethics

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### 2.3. Standards of conduct

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## 3. ELECTRONIC PRINCIPLES AND APPLICATIONS

### 3.1. Direct current (DC) circuits

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### 3.2. Alternating current (AC) circuits

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### 3.3. Solid state devices

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### 3.4. Integrated circuits/devices

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### 3.5. Digital techniques

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### 3.6. Microprocessors

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### 3.7. Motors

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## 4. BIOMEDICAL PRINCIPLES

### 4.1. Anatomy and physiology

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### 4.2. Medical terminology

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### 4.3. Applications of transducers

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### 4.4. Applications of electrodes

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5. PHYSICS PRINCIPLES APPLICABLE TO BIOMEDICAL EQUIPMENT MAINTENANCE

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<tr>
<th>Task Description</th>
<th>Skill Level</th>
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<tbody>
<tr>
<td>5.1. Hydraulic</td>
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<tr>
<td>5.2. Mechanical</td>
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<tr>
<td>5.3. Optical</td>
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<td>B</td>
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<td>5.4. Pneumatic</td>
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<tr>
<td>5.5. Radiation</td>
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<td>5.6. Acoustics</td>
<td>B</td>
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<tr>
<td>5.7. Light Amplification by Stimulated Emission of Radiation (LASER)</td>
<td>B</td>
<td>B</td>
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<tr>
<td>5.8. Ultrasound</td>
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<tr>
<td>5.9. Steam</td>
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<tr>
<td>5.10. Electromagnetic emissions</td>
<td>B</td>
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6. FACILITY/EQUIPMENT INTERFACE

<table>
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<th>Task Description</th>
<th>Skill Level</th>
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<tbody>
<tr>
<td>6.1. Electrical distribution system</td>
<td>B</td>
<td>B</td>
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<tr>
<td>6.1.1. Single phase</td>
<td>B</td>
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<td>6.1.2. Three phase</td>
<td>B</td>
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<td>6.1.3. Isolated</td>
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<td>6.1.4. Emergency</td>
<td>B</td>
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<td>6.1.5. Grounding</td>
<td>B</td>
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<td>6.1.6. Protective devices</td>
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<td>6.1.7. Transformers</td>
<td>B</td>
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<td>6.1.8. Wire sizing</td>
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<td>6.2. Vacuum systems</td>
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<td>6.3. Central gas systems</td>
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<td>6.4. Plumbing</td>
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<td>6.5. Environmental control systems</td>
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<td>6.6. Structural requirements</td>
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##### 7.6.4. Compressed gas

- B - B - -

##### 7.6.5. Noise

- B - B - -

##### 7.6.6. Occupationally hazardous gases

- B - B - -

##### 7.6.7. Inhalation anesthetizing location

- B - B - -

##### 7.6.8. Mechanical

- B - B - -

##### 7.6.9. Batteries

- B - B - -

##### 7.6.10. Thermal

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##### 7.6.11. Magnetic

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##### 7.6.12. Lockout-tagout program

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##### 7.6.12.1. Perform lockout-tagout procedures

- 1a - c - -

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| 11.2. Maintain technical reference files | 5 | - | - | b | - | - |
| 11.3. Maintain equipment data files | 5 | a | - | b | - | - |

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<p>| 12.1. Equipment acquisition | - | - | - | A | - | B |
| 12.1.1. Evaluate equipment requests | 7 | - | - | b | - | c |
| 12.1.2. Plan equipment installation | - | - | b | - | c |
| 12.1.3. Execute equipment installation | - | - | b | - | c |
| 12.1.4. Perform acceptance inspection | 5 | 2b | - | b | - | - |
| 12.2. Quality assurance | - | - | - | - | - | - |
| 12.2.1. Equipment modifications | - | - | - | A | - | B |
| 12.2.2. Initiate Product Quality Deficiency Report (PQDR) | 7 | - | - | b | - | c |
| 12.2.3. Perform hazard notice procedures | 5 | - | - | b | - | c |
| 12.2.4. Centrally managed device codes | - | - | A | - | B |
| 12.2.5. Assign condition codes | 5 | 2b | - | b | - | - |
| 12.2.6. Assign maintenance assessments | - | - | - | - | - | - |
| 12.2.7. Quality assurance program | - | - | - | - | - | - |
| 12.2.7.1. Assess equipment data quality | 7 | - | - | b | - | b |
| 12.2.7.2. Perform work order quality control | 7 | - | - | b | - | b |
| 12.2.8. Food and Drug Administration Modernization Act (FDAMA) of 1997 | A | - | B | - | B |
| 12.2.9. Perform incident investigations | 7 | - | - | b | - | c |
| 12.3. Recommend equipment replacement | 7 | - | - | b | - | c |
| 12.4. Perform equipment disposition | 5 | - | - | b | - | - |</p>
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14.11. Oxygen storage and generation systems

14.11.1. Oxygen concentration system

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| 14.11.1.2. Perform preventive maintenance inspection | 2b | - | c | - | - |
| 14.11.1.3. Perform calibration/verification      | b | - | c | - | - |
| 14.11.1.4. Isolate malfunctions   | 2b | - | - | - | - |
| 14.11.1.5. Install                          | a | - | c | - | - |
| 14.11.1.6. Common malfunctions | - | - | B | - | - |

14.11.2. Oxygen storage system

| 14.11.2.1. System application      | B | - | B | - | - |
| 14.11.2.2. Perform preventive maintenance inspection | 2b | - | - | - | - |

14.11.3. Liquid oxygen system

| 14.11.3.1. System application          | B | - | B | - | - |
| 14.11.3.2. Perform organizational maintenance | a | - | - | - | - |

14.12. Field communications equipment

| 14.12.1. System application           | - | - | - | - | - |
| 14.12.2. Perform operational inspection | - | - | - | - | - |
| 14.12.3. Perform organizational maintenance | - | - | - | - | - |
| 14.12.4. Install                     | - | - | - | - | - |

14.13. Field sterilizers

<p>| 14.13.1. System application          | A | - | B | - | - |
| 14.13.2. Perform preventive maintenance inspection | - | - | - | - | - |
| 14.13.3. Perform calibration/verification | - | - | - | - | - |
| 14.13.4. Isolate malfunctions        | - | - | - | - | - |
| 14.13.5. Install                    | 2b | - | - | - | - |
|---------------------------------------------|--------------|----------------------|-------------------------------------------------------------|
| 14.14 Field sterilizer water recovery system | A - B | 5-Skill Level (1) | Course (1) CDC (1) Course (2) CDC |
| 14.14.1. System application | - | - | - |
| 14.14.2. Perform preventive maintenance inspection | - | - | - |
| 14.14.3. Install | 2b | - | - |
| 14.15 Field diagnostic radiographic system (fixed) | - | - | - |
| 14.15.1. Clinical applications | - | - | - |
| 14.15.2. Perform preventive maintenance inspection | - | - | - |
| 14.15.3. Perform system calibration/verification | - | - | - |
| 14.15.4. Isolate malfunctions | - | - | - |
| 14.15.5. Install | - | - | - |
| 14.16 Field dental operating system | - | - | - |
| 14.16.1. Clinical applications | - | - | - |
| 14.16.2. Perform preventive maintenance inspection | - | - | - |
| 14.16.3. Isolate malfunctions | - | - | - |
| 14.16.4. Install | - | - | - |
| 14.16.5. Maintain dental compressor systems | - | - | b |
| 14.17 Frequency converter | - | - | - |
| 14.17.1. System application | B - B | - |
| 14.17.2. Perform operational inspection | 2b | - | - |
| 14.17.3. Perform safety inspection | 2b | - | - |
| 14.18 Wound therapy unit | - | - | - |
| 14.18.1. Clinical applications | - | - | - |
| 14.18.2. Perform preventive maintenance | - | - | - |
| 14.18.3. Perform system calibration/verification | - | - | - |
| 14.18.4. Isolate malfunctions | - | - | - |</p>
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17.20.5.4. Isolate malfunctions

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17.20.6. Telemetry monitors

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17.20.7. Pulse oximeters

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17.20.8. Automatic blood pressure monitors (invasive)

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17.20.9. Carbon dioxide monitors

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17.20.9.3. Perform system calibration/verification

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17.20.9.4. Isolate malfunctions

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17.20.10. Patient thermometers

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**17.25.1.2. Perform preventive maintenance inspection**
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**17.25.1.3. Perform system calibration/verification**
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**17.25.1.4. Isolate malfunctions**
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**17.25.3. Slit Lamp**

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**17.25.5. Retinascope**

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Technical Reference (TR) Source Summary for STS 4A2X1
This list includes both commercial and government publications

NOTES:
Training references (TRs) for this career field are numerous and it is not practical to list them all in the specialty training standard table within each section header. Instead, TRs for entire sections are listed here by section number with identified skill levels that use those TRs.
Most commercial training references are listed in the following format: Title (with edition if applicable), author, year of publication, and publisher.
Some non-government publications published by organizations are updated quite often, and these may not include edition numbers or year of publication (e.g., International Electrotechnical Commission-IEC, American National Standards Institute-ANSI, International Organization for Standardization-ISO, etc.).
Government publications are listed per that department's naming convention.

SECTION 1, CAREER LADDER PROGRESSION
Applies to 5 and 7 skill levels
AFMAN 36-2100, Military Utilization and Classification
AFI 38-101, Manpower and Organization
AFPD 44-1, Medical Operations
Air Force Enlisted Classification Directory (AFECID)

SECTION 2, PROFESSIONAL AND PATIENT RELATIONSHIPS
Applies to all skill levels
DHA-IPM 18-012, The Department of Defense Medical Ethics Program in the Military Health System
DoDI 6025.27, Medical Ethics in the Military Health System

SECTION 3, ELECTRONIC PRINCIPLES AND APPLICATIONS
Applies to all skill levels
Electronic fundamentals: Circuits, devices, and applications, 8th edition, Floyd T and Buchla D. 2009, Pearson

SECTION 4, BIOMEDICAL PRINCIPLES
Applies to all skill levels
Introduction to biomedical engineering technology, 3rd edition, Street L. J, 2016, CRC Press
Medical instrumentation application and design, 5th edition, Webster J. G, and Nimunkar A. J, 2020, Wiley

SECTION 5, PHYSICS PRINCIPLES APPLICABLE TO BIOMEDICAL EQUIPMENT MAINTENANCE
Applies to all skill levels


SECTION 6, FACILITY/EQUIPMENT INTERFACE

Applies to all skill levels


UL standard 943: Ground fault circuit-interrupters, 5th edition, UL, 2016, UL


UL standard 1436: Outlet circuit testers and similar indicating devices, 6th edition, UL, 2016, UL

Unified facilities criteria 4-510-01: Design military medical facilities, Change 2, 2019

SECTION 7, OCCUPATIONAL SAFETY AND HEALTH (OSHA) PROGRAM

Applies to all skill levels

AAMI HA60601-1-11: Requirements for medical electrical equipment, AAMI, 2015, AAMI

AFI 41-201, Managing Clinical Engineering Programs

AFI 48-127, Occupational Noise and Hearing Conservation Program

AFI 48-139, LASER and Optical Radiation Protection Program


AFMAN 91-203, Air Force Occupational Safety, Fire, and Health Standards

ANSI Z136.1: Safe use of lasers, Laser Institute of America, 2014, Laser Institute of America

AFPD 91-2, Safety Programs

ANSI Z136.3: Safe use of lasers in health care, Laser Institute of America, 2018, Laser Institute of America

CGA C-6: Standard for visual inspection of steel compressed gas cylinders, 12th edition, CGA, 2019, CGA


CGA P-1: Safe handling of compressed gases in containers, CGA, 2015, CGA

CGA P-2: Characteristics and safe handling of medical gases, 10th edition, CGA, 2013, CGA

CGA V-5: Standard bulk refrigerated liquid transfer connections, CGA, 2014, CGA


Guidelines for environmental infection control in health-care facilities: Recommendations of CDC and the healthcare infection control, practices advisory committee (HICPAC), CDC, 2019, CDC

NCRP report 102: Medical x-ray, electron beam and gamma-ray protection for energies up to 50 MeV (equipment design, performance and use)
NCRP report 105: Radiation protection for medical and allied health personnel
NCRP report 107: Implementation of the principle of as low as reasonably achievable (ALARA) for medical and dental personnel
NFPA 53: Recommended practice on materials, equipment, and systems used in oxygen-enriched atmospheres, 2016 edition, NFPA, 2015, NFPA
NFPA 77: Recommended practice on static electricity, 2019 edition, NFPA, 2019, NFPA

SECTION 8, TOOLS, HARDWARE, TEST EQUIPMENT AND TECHNIQUES

Applies to all skill levels

AAMI Electrical safety manual 2015, Baretich, M. F, 2015, Association for the Advancement of Medical Instrumentation
AFMAN 91-203, Air Force Occupational Safety, Fire, and Health Standards
TO 00-25-234, General Shop Practice Requirements for the Repair, Maintenance and Test of Electrical Equipment
TO 32-1-101, Use and Care of Hand Tools and Measuring Tools

SECTION 9, PUBLICATIONS MANAGEMENT

Applies to all skill levels

AFI 33-322, Communications and Information; Records Management and Information Governance Program
DAFI 33-360, Publications and Forms Management

SECTION 10, MEDICAL MATERIEL ACQUISITION AND ACCOUNTABILITY

Applies to all skill levels

AFI 41-201, Managing Clinical Engineering Programs
AFI 64-117, Government Purchase Card Program
AFMAN 41-209, Medical Logistics Support

SECTION 11, MAINTENANCE ADMINISTRATION

Applies to all skill levels

AFI 23-101, Materiel Management Policy
AFI 41-201, Managing Clinical Engineering Programs
AFMAN 41-209, Medical Logistics Support

SECTION 12, MEDICAL EQUIPMENT CONTROL

Applies to all skill levels
SECTION 13, MAINTENANCE MANAGEMENT FUNCTIONS

 Applies to all skill levels


 AFI 41-201, Managing Clinical Engineering Programs

 AFMAN 41-209, Medical Logistics Support


SECTION 14, READINESS

 Applies to all skill levels

 AFI 41-106, Air Force Medical Readiness Program

 AFMAN 41-209, Medical Logistics Support

 AFMAN 10-2909, Aeromedical Evacuation (AE) Equipment Standards

 TO 13C7-34-2-1, Operational Medical Logistics

 TO 35CA2-2-10-1, Secondary Distribution Center

 TO 35CA6-1-101, Power Distribution Panel

 TO 35C2-3-519-1, Operator’s Manual for Generator Set, Skid Mounted, Tactical Quiet

 TO 35E4-177-1, Operator, Organizational, Direct Support, and General Support Maintenance for Shelter, Tactical, Expandable, Two-Sided

 TO 35E9-314-1, Operator, Unit, Direct Support and General Support Maintenance Manual, Field Deployable Environmental Control Unit

 TO 35E51-101, Operator, Unit and Direct Support Maintenance Manual for Tent General Purpose

SECTION 15, THERAPEUTIC EQUIPMENT SYSTEMS

 Applies to all skill levels

 21 CFR: Food and drugs, chapter I, food and drug administration, subchapter H, medical devices

 AAMI AT6: Autologous transfusion devices, AAMI, 2013, AAMI

 AAMI EQ 56: Recommended practice for a medical equipment management program, AAMI, 2013, ANSI

 ADA standard 44: Dental electrosurgical equipment, ADA, 1979, American Dental Association

 ADA standard 47: Dental units, ADA, 2006, American Dental Association

 ADA standard 94: Dental compressed air quality, ADA, 1996, American Dental Association

 AFI 41-201, Managing Clinical Engineering Programs
ANSI Z136.3: Safe use of lasers in health care, Laser Institute of America, 2018, Laser Institute of America
IEC 60601-2-2: Medical electrical equipment - Part 2-2: Particular requirements for the basic safety and essential performance of high frequency surgical equipment and high frequency surgical accessories
IEC 60601-2-4: Medical electrical equipment - Part 2-4: Particular requirements for the basic safety and essential performance of cardiac defibrillators
IEC 60601-2-10: Medical electrical equipment - Part 2-10: Particular requirements for the basic safety and essential performance of nerve and muscle stimulators
IEC 60601-2-12: Medical electrical equipment - Part 2-12: Particular requirements for the basic safety and essential performance of critical care ventilators
IEC 60601-2-16: Medical electrical equipment - Part 2-16: Particular requirements for basic safety and essential performance of haemodialysis, haemodiafiltration and haemofiltration equipment
IEC 60601-2-19: Medical electrical equipment - Part 2-19: Particular requirements for the basic safety and essential performance of infant incubators
IEC 60601-2-20: Medical electrical equipment - Part 2-20: Particular requirements for the basic safety and essential performance of infant transport incubators
IEC 60601-2-21: Medical electrical equipment - Part 2-21: Particular requirements for the basic safety and essential performance of infant radiant warmers
IEC 60601-2-52: Medical electrical equipment - Part 2-52: Particular requirements for the basic safety and essential performance of medical beds
ISO 10079.1: Medical suction equipment: Electrically powered suction equipment, ISO, 2015, ISO
ISO 10651-3: Lung ventilators for medical use - Part 3: Particular requirements for emergency and transport ventilators
ISO 80601-2-13: Medical electrical equipment - Part 2-13: Particular requirements for basic safety and essential performance of an anesthetic workstation

SECTION 16, THERAPEUTIC SUPPORT EQUIPMENT

 Applies to all skill levels

 21 CFR: Food and drugs, chapter I, food and drug administration, subchapter H, medical devices
AAMI EQ 56: Recommended practice for a medical equipment management program, AAMI, 2013, ANSI
AFI 41-201, Managing Clinical Engineering Programs
ANSI/AAMI standard 8: Hospital steam sterilizers, AAMI, 2009, AAMI
ANSI/AAMI standard 58: Chemical sterilization and high-level disinfection in health care facilities, AAMI, 2018, ANSI
ANSI/ADA standard 48: Visible light curing units, ADA, 2013, American Dental Association
ISO 15883-1: Washer-disinfectors - Part 1: General requirements, terms and definitions and tests

SECTION 17, DIAGNOSTIC EQUIPMENT SYSTEMS

 Applies to all skill levels

 21 CFR: Food and drugs, chapter I, food and drug administration, subchapter H, medical devices
AAMI EQ 56: Recommended practice for a medical equipment management program, AAMI, 2013, ANSI
AFI 41-201, Managing Clinical Engineering Programs
IEC 60601-2-11: Medical electrical equipment - Part 2-11: Particular requirements for the basic safety and essential performance of gamma beam therapy equipment
IEC 60601-2-25: Medical electrical equipment - Part 2-25: Particular requirements for the basic safety and essential performance of electrocardiographs
IEC 60601-2-26: Medical electrical equipment - Part 2-26: Particular requirements for the basic safety and essential performance of electroencephalographs
IEC 60601-2-27: Medical electrical equipment - Part 2-27: Particular requirements for the basic safety and essential performance of electrocardiographic monitoring equipment
IEC 60601-2-28: Medical electrical equipment - Part 2-28: Particular requirements for the basic safety and essential performance of x-ray tube assemblies for medical diagnosis
IEC 80601-2-30: Medical electrical equipment - Part 2-30: Particular requirements for basic safety and essential performance of automated non-invasive sphygmomanometers
IEC 60601-2-32: Medical electrical equipment - Part 2: Particular requirements for the safety of associated equipment of x-ray equipment
IEC 60601-2-33: Medical electrical equipment - Part 2-33: Particular requirements for the basic safety and essential performance of magnetic resonance equipment for medical diagnosis
IEC 60601-2-34: Medical electrical equipment - Part 2-34: Particular requirements for the basic safety and essential performance of invasive blood pressure monitoring equipment
IEC 60601-2-37: Medical electrical equipment - Part 2-37: Particular requirements for the basic safety and essential performance of ultrasonic medical diagnostic and monitoring equipment
IEC 60601-2-51: Medical electrical equipment - Part 2-51: Particular requirements for safety, including essential performance, of recording and analysing single channel and multichannel electrocardiographs
IEC 60601-2-54: Medical electrical equipment - Part 2-54: Particular requirements for the basic safety and essential performance of X-ray equipment for radiography and radioscopy
NCRP report 102: Medical x-ray, electron beam and gamma-ray protection for energies up to 50 MeV (equipment design, performance and use)
NCRP report 105: Radiation protection for medical and allied health personnel
NCRP report 107: Implementation of the principle of as low as reasonably achievable (ALARA) for medical and dental personnel
NCRP report 127: Operational radiation safety program

SECTION 18, DIAGNOSTIC SUPPORT EQUIPMENT

Applies to all skill levels

21 CFR: Food and drugs, chapter I, food and drug administration, subchapter H, medical devices
AFI 41-201, Managing Clinical Engineering Programs
AAMI EQ 56: Recommended practice for a medical equipment management program, AAMI, 2013, ANSI
IEC 60601-2-18: Medical electrical equipment - Part 2-18: Particular requirements for the basic safety and essential performance of endoscopic equipment
UL standard 1778: Uninterruptible power systems, 5th edition, UL, 2017, UL

SECTION 19, SUPERVISION AND TRAINING CERTIFICATIONS

Applies to all skill levels

AFI 41-104, Professional Board and National Certification Examinations
Computer Technology Industry Association (CompTIA) Certifications. There are no specific training references for CompTIA, but the CompTIA A+, CompTIA Net+, CompTIA Sec+ and other CompTIA certifications are acquired through vendor-neutral examinations. Personnel who want to take any of the examinations must purchase an exam voucher (valid for 1 year) from the CompTIA marketplace, and then the test is proctored by Pearson VUE. Test takers must create an account on Pearson VUE’s website in order to take the certification test. Personnel may purchase optional test preparation packages that are available on the CompTIA website or third-party providers.
DoD 8530.1-M, Department of Defense Computer Network Defense (CND) Service Provider Certification and Accreditation program
DoD 8570.01-M, Information Assurance workplace Improvement Program

SECTION 20, HEALTHCARE INFORMATION TECHNOLOGY MANAGEMENT

Applies to all skill levels

45 CFR: Department of health and human services, part 160, general administrative requirements
45 CFR: Department of health and human services, part 162, administrative requirements
45 CFR: Department of health and human services, part 164, security and privacy
Bright ideas: Case studies and practical tips to improve technology management in your healthcare facility, AAMI, 2011, AAMI
Computer Technology Industry Association (CompTIA) Certifications. There are no specific training references for CompTIA, but the CompTIA A+, CompTIA Net+, CompTIA Sec+ and other CompTIA
certifications are acquired through vendor-neutral examinations. Personnel who want to take any of the examinations must purchase an exam voucher (valid for 1 year) from the CompTIA marketplace, and then the test is proctored by Pearson VUE. Test takers must create an account on Pearson VUE’s website in order to take the certification test. Personnel may purchase optional test preparation packages that are available on the CompTIA website or third-party providers.


DoD 8530.1-M, Department of Defense Computer Network Defense (CND) Service Provider Certification and Accreditation program

DoD 8570.01-M, Information Assurance workplace Improvement Program

National industrial security program operating manual (NISPOM), DoD, 2020, Red Bike Publishing


Security and privacy controls for information systems and organizations: Special publication 800-53, National Institute of Standards and Technology

SECTION 21, MEDICAL DEVICE INFORMATION TECHNOLOGY SYSTEMS (MDITS)

Applies to all skill levels

Computer Technology Industry Association (CompTIA) Certifications. There are no specific training references for CompTIA, but the CompTIA A+, CompTIA Net+, CompTIA Sec+ and other CompTIA certifications are acquired through vendor-neutral examinations. Personnel who want to take any of the examinations must purchase an exam voucher (valid for 1 year) from the CompTIA marketplace, and then the test is proctored by Pearson VUE. Test takers must create an account on Pearson VUE’s website in order to take the certification test. Personnel may purchase optional test preparation packages that are available on the CompTIA website or third-party providers.


National industrial security program operating manual (NISPOM), DoD, 2020, Red Bike Publishing
Section B – Course Objective List
1. If a written copy of the Course Objectives List is required, contact BMET Training Program Curriculum Support at METC, DSN 420-1890.
2. Career Development Course: CDC information can be obtained from the Air Force Career Development Academy at Keesler AFB, MS.

Section C – Support Materials
There are currently no support materials requirements. This area is reserved.

Section D – Training Course Index

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<tr>
<td>L5ABJ4A231 00AA</td>
<td>Biomedical Equipment Technician (AF)</td>
<td>220 Days</td>
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<td>Advanced Field Medical Support Systems</td>
<td>14 Days</td>
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<td>Advanced Radiographic/Fluoroscopic and Acceptance</td>
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<td>Medical Laser Systems</td>
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<td>CDC4A251B</td>
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<td>CDC4A271</td>
<td>Biomedical Equipment Craftsman</td>
<td>2 Volumes</td>
<td>AFCDA-Virtual</td>
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</table>

Section E – MAJCOM Unique Requirements
1. Air Reserve Component (ARC). The ARC is comprised of the Air Force Reserves and Air National Guard and serves to provide AFRES/ANG Biomedical Equipment Technician (BMET) apprentices (non-prior-service and retrainees) with an opportunity to receive the additional training days necessary to become proficient in maintaining biomedical equipment that is identified in this STS as a core task. This section applies to all BMETs assigned to all Air Force Reserve and Air National Guard medical and aeromedical evacuation squadrons (referred to
hereafter as medical unit).

1.1. Qualification (also referred to as proficiency or seasoning) training requirements:

1.1.1. Qualification training days is available for AFRES/ANG BMET apprentices to satisfactorily initiate and complete the core task training requirements identified in this STS. See AFRCI 36-2603, Air Force Reserve Seasoning Training Program (STP).

1.1.2. Upon completion of the Biomedical Equipment Technician training program at METC, all BMET apprentices will be assigned to a qualified MTF for 120 days to acquire proficiency in performing the core tasks required to successfully achieve the 5-skill level according to Air Force upgrade training guidelines. A qualified MTF (hospital, medical center, or joint currency platform) is defined as a facility which possesses the time, equipment, and expertise necessary to train the apprentice on all core tasks as outlined in this STS.

1.1.3. For optimal results, this follow-on training should commence immediately following graduation from the Biomedical Equipment Technician Apprentice training program.

1.2. Advanced planning is required to ensure the apprentice receives qualification training immediately upon graduating from the Biomedical Equipment Technician course. With concurrence from the ARC medical unit commander, the section BMET supervisor, in conjunction with the senior air reserve/health technician must contact the qualified MTF to arrange follow-on training for the newly assigned BMET trainee (4A2X1). The senior BMET at the qualified MTF must ensure that an experienced, qualified BMET supervisor is assigned to assist the apprentice in gaining the desired confidence and proficiency. The training schedule must be finalized prior to the Biomedical Equipment Technician Apprentice training program graduation date.

1.3. AFRES/ANG unit of assignment must ship the apprentice’s BMET toolkit to the Guard or Reserve liaison at JBSA Ft Sam Houston TX. The BMET apprentice requires a toolkit to perform follow-on qualification training at the qualified MTF. (NOTE: All BMETs in the active, Guard, and Reserve require an AF standard issue toolkit to perform duties during peacetime and contingency operations. ARC BMETs are issued a toolkit from their unit of assignment.) Four weeks before the apprentice graduates from the apprentice course, the senior air reserve/health technician will ship the BMET tool kit to the Guard or Reserve liaison depending upon which component the apprentice is assigned. The guard liaison can be reached at DSN 420-2658. The address is as follows: Air National Guard/Reserve Component Liaison 2931 Harney Rd Second Floor, JBSA-Ft Sam Houston, TX 78234.

1.4. To ensure continuity between BMET resident training and upgrade training at the qualified MTF, the student will forward a copy of the technical school completion certificate to the gaining unit of assignment. The ANG/ARC unit of assignment will then initiate upgrade action using AF Form 2096 to award the 3-skill level and enter the apprentice in the appropriate training status code.

1.5. The apprentice BMET AFSC upgrade training requirements may be accomplished at the civilian MTF under the direct supervision of an experienced, qualified BMET supervisor. If the apprentice BMET is employed as a BMET in the civilian sector, has immediate access to the same types of biomedical equipment identified in this STS, and does not receive the appropriate number of qualification training days necessary to successfully complete all core tasks, then this training may be accomplished at the apprentice’s civilian MTF under the direct supervision of a
qualified BMET. The apprentice must present the supervisor with the original copy of the Biomedical Equipment Technician STS. As the required core tasks are successfully completed, the supervisor is authorized to sign-off on the STS indicating that the apprentice has satisfactorily completed each core task.

1.6. The medical AFRC/ANG unit may submit a waiver to bypass the above qualification training if proficiency days are unavailable. In the case where qualification training days are unavailable at the base and the headquarters, the proficiency training may be waived until such time that days become available and the apprentice has an opportunity to train on the equipment identified in this STS. The waiver package must be sent to the 4A2X1 Air Force Career Field Manager, Air Force Medical readiness Agency, Ft. Detrick, MD through HQ AFRC/ANG Biomedical Equipment Functional Manager. The AF Reserves Functional Manager can be reached at DSN 472-6080 and the Air National Guard Functional Manager can be reached at DSN 612-8294.

Section F – Documentation of Training

1. Work Center Training Plans. The purpose of this section is to provide guidelines and examples of proper documentation for the many electronic forms used in training all enlisted medical personnel. Training documentation helps to assess readiness capability, as well, as individual strengths and weaknesses. It also aids in compliance with all The Joint Commission and other regulatory requirements, as applicable. The enlisted training documentation has migrated from the hard copy to electronic TFTR. TFTR is accessible from the Advance Distance Learning Service via the Air Force Portal. Refer to your unit training manager (UTM) for the most current policies and guidance on training documentation.

2. Total Force Training Record. The TFTR is an enterprise-wide custom training management system designed to replace the paper-based training records system. It is the electronic equivalent of an AF Form 623, Individual Training Record Folder, and will be used by career fields within the AFMS to document all training actions. The TFTR allows training plans to be established by Career Field/AFSC, duty position/team member, trainee/trainer/certifier, and any group of tasks that require management, tracking, and documentation. The TFTR components are managed by the supervisor.

3. Documentation of Training. The purpose of this section is to provide guidelines and examples of proper documentation on the many forms used in training medical materiel personnel. Training documentation helps to assess mission capability and readiness, individual strengths and weaknesses, resources needed to support quality patient care, and defines requirements for individual career progression.

3.1. AF Form 797 is be used to record training for tasks that are not otherwise documented in the CFETP.

3.2. AF Form 1098 is used to list mandatory training requirements that may vary from facility to facility. At a minimum, these requirements should be reviewed on an annual basis and updated as required.

3.3. Qualification Training Progress Records were developed to enhance OJT. It provides the trainer with a breakdown of task performance skills to aid in performance evaluation. The evaluations of each task results in either a satisfactory or unsatisfactory score.

3.4. AF Form 623a. Use the AF Form 623a available in the TFTR to document all progress of
individual training. Document on AF Form 623a the start and completion dates of unit orientation, and reference the date of the orientation checklist. In addition, document the member’s entry into upgrade training, initial evaluation results, and periodic evaluations of training progress to include CDC progress. Information on extensions, waiver requests, or breaks in training should be clearly documented. Document on the AF Form 623a any decertification proceedings, including dates, reasons for decertification, and other applicable information. Accomplish an initial evaluation when a new person arrives to the unit or when an individual changes duty positions. Document all other actions pertaining to training IAW AFI-36-2670. NOTE: Templates for documentation of orientation, initial upgrade training brief, upgrade training documentation, sample job description review, are housed in TFTR.