

COMPETENCY-BASED OCCUPATIONAL FRAMEWORK FOR REGISTERED APPRENTICESHIP

Avionics Technician

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Competency-Based Occupational Frameworks

The Urban Institute, under contract with the US Department of Labor, has worked with employers, subject matter experts, labor unions, trade associations, credentialing organizations, and academics to develop Competency-Based Occupational Frameworks (CBOFs) for Registered Apprenticeship programs. These frameworks define the **purpose** of an occupation, the **job functions** that are carried out to fulfill that purpose, the **competencies** that enable the apprentice to execute those job functions well, and the **performance criteria** that define the specific knowledge, skills, and personal attributes associated with high performance in the workplace. This organizational hierarchy—job purpose, job functions, competencies, performance criteria—is designed to illustrate that performing work well requires more than just acquiring discrete knowledge elements or developing a series of manual skills. To perform a job well, the employee must be able to assimilate knowledge and skills learned in various settings, recall and apply that information to the present situation, and carry out work activities using sound professional judgment, demonstrating an appropriate attitude or disposition and achieving a level of speed and accuracy necessary to meet the employer’s business need.

The table below compares the terminology of Functional Analysis with that of traditional Occupational Task Analysis to illustrate the important similarities and differences. While both identify the key technical elements of an occupation, functional analysis includes the identification of behaviors, attributes, and characteristics of workers necessary to meet an employer’s expectations.

Framework Terminology	Traditional Task Analysis Terminology
Job Function: the work activities that are carried out to fulfill the job purpose	Job Duties: roles and responsibilities associated with an occupation
Competency: the actions an individual takes and the attitudes he/she displays to complete those activities	Task: a unit of work or set of activities needed to produce some result
Performance Criteria: the specific knowledge, skills, dispositions, attributes, speed, and accuracy associated with meeting the employer’s expectations	Subtask: the independent actions taken to perform a unit of work or activity

Although designed for use in competency-based apprenticeship, these Competency-Based Occupational Frameworks also support time-based apprenticeship by defining more clearly and precisely what an apprentice is expected to learn and do during the allocated time period.

CBOFs are comprehensive to encompass the full range of jobs that may be performed by individuals in the same occupation. As employers or sponsors develop their individual apprenticeship programs, they can extract from or add to the framework to meet their unique organizational needs.

Components of the Competency-Based Occupational Framework

Occupational Overview: This section of the framework provides a description of the occupation including its purpose, the setting in which the job is performed, and unique features of the occupation.

Work Process Schedule: This section includes the job functions and competencies that would likely be included in an apprenticeship sponsor's application for registration. These frameworks provide a point of reference that has already been vetted by industry leaders so sponsors can develop new programs knowing that they will meet or exceed the consensus expectations of peers. Sponsors maintain the ability to customize their programs to meet their unique needs, but omission of a significant number of job functions or competencies should raise questions about whether or not the program has correctly identified the occupation of interest.

Cross-Cutting Competencies: These competencies are common among all workers and focus on the underlying knowledge, attitudes, personal attributes, and interpersonal skills that are important regardless of the occupation. That said, while these competencies are important to all occupations, the relative importance of some versus others may change from one occupation to the next. These relative differences are illustrated in this part of the CBOF and can be used to design pre-apprenticeship programs or design effective screening tools when recruiting apprentices to the program.

Detailed Job Function Analysis: This portion of the framework includes considerable detail and is designed to support curriculum designers and trainers in developing and administering the program. The detail in this section may be confusing to those seeking a more succinct, higher-level view of the program. For this reason, we recommend that the Work Process Schedule be the focus of program planning activities, leaving the detailed job function analysis sections to instructional designers as they engage in their development work.

- a. **Related Technical Instruction:** Under each job function appears a list of foundational knowledge, skills, tools, and technologies that would likely be taught in the classroom to enable the apprentice's on-the-job training safety and success.
- b. **Performance Criteria:** Under each competency, we provide recommended performance criteria that could be used to differentiate between minimally, moderately, and highly competent apprentices. These performance criteria are generally skills based rather than knowledge based, but may also include dispositional and behavioral competencies.

Using the Competency-Based Occupational Framework to Develop a Registered Apprenticeship Program

When developing a registered apprenticeship program, the Work Process Schedule included in this CBOF provides an overview of the job functions and competencies an expert peer group deemed to be important to this occupation. The Work Process Schedule in this document can be used directly, or modified and used to describe your program content and design as part of your registration application.

When designing the curriculum to support the apprenticeship program—including on-the-job training and related technical instruction—the information the Detailed Job Functions section could be helpful. These more detailed job function documents include recommendations for the key knowledge and skills that might be included in the classroom instruction designed to support a given job function, and the performance criteria provided under each competency could be helpful to trainers and mentors in evaluating apprentice performance and insuring inter-rater reliability when multiple mentors are involved.

Avionics Technician Occupational Overview

Occupational Purpose and Context

Avionics Technicians install, inspect, test, adjust, or repair aerospace electronics equipment, traditionally including—but not limited to—communication, navigation, surveillance, and connectivity systems, as well as control and information systems in aircraft or space vehicles.

Potential Job Titles

Aircraft Technician, Aircraft Electronics Technician, Aerospace Electronics Technician, Avionics Electronics Technician, Avionics Installer, Avionics Manager, Avionics Systems Integration Specialist, Avionics Technician, Avionics Bench Repair Technician

Attitudes and Behaviors

Avionics Technicians should have well-developed critical thinking skills to design, install, service, and integrate avionics, electronics, and digital communication systems. These skills will help technicians solve problems quickly, identify errors or inconsistencies in product quality, pay attention to detail, observe the work process despite distractions, synthesize information to form general rules or conclusions that they should communicate clearly, and arrange objects or actions in an order or pattern related to a specific rule or set of rules.

Apprenticeship Prerequisites

A high school diploma and the ability to pass a drug or background screening test are often necessary.

Occupational Pathways

Avionics Technicians may start in or move into two fields:

1. Technical Skills Line—installation, bench technician
2. Product Line—general, business, commercial aviation, troubleshooting, testing

Certifications, Licensure, and Other Credential Requirements

Credential	Offered by	Before, During, or After Apprenticeship
Repairman Certificate	Federal Aviation Administration (FAA)	During and after
General Radio Telephone Operator's License (GROL), plus endorsements	Federal Communications Commission (FCC)	Anytime
Aircraft Electronics Technician (AET), plus endorsements	ASTM International	Anytime
Mechanics Certificate, Airframe rating	Federal Aviation Administration (FAA)	Anytime

Job Functions

Job Functions	Core or Optional
1. Maintains safety, health, and professionalism at work	Core
2. Follows company and regulatory guidelines	Core
3. Locates and uses technical data	Core
4. Demonstrates ground operation and servicing to include protection of employer and customer assets	Core
5. Identifies and uses tools and test equipment	Core
6. Performs electrical system calculations and analysis	Core
7. Installs and maintains electrical wiring harnesses, electronic components, and instruments	Core
8. Fabricates, modifies, and repairs aircraft structures	Core
9. Performs operational checks of aircraft systems and components	Core
10. Diagnoses and troubleshoots malfunctions and operational problems	Core
11. Designs and integrates avionics system installations	Core
12. Configures avionics equipment and manages databases and software	Core
13. Prepares, updates, and maintains maintenance records, install and repair work	Core

Stackable Programs

This occupational framework is designed to link to the following additional framework(s) as part of a career laddering pathway.

Stackable Programs	Base or Higher Level	Stacks on Top of
1.		
2.		
3.		
4.		
5.		

Options and Specializations

The following options and specializations have been identified for this occupation. The Work Process Schedule and individual job function outlines indicate which job functions and competencies were deemed by industry advisors to be optional. Work Process Schedules for Specializations are included at the end of this document.

Options and Specializations	Option	Specialization
Aircraft Technician		
Avionics Bench Repair Technician		
Avionics Technician		
Avionics Systems Integration Specialist		
Avionics Manager		
Avionics Installer		
Avionics Electronics Technician		
Aerospace Electronics Technician		
Aircraft Electronics Technician		

Levels

Industry advisors have indicated that individuals in this occupation may function at different levels, based on the nature of their work, the amount of time spent in an apprenticeship, the level of skills or knowledge mastery, and the degree of independence in performing the job or supervisory/management responsibilities.

Level	Distinguishing Features	Added Competencies	Added Time Requirements
1.	Technician		
2.	Lead Technician		
3.	Supervisor		
4.	Manager		

Work Process Schedule

WORK PROCESS SCHEDULE		ONET Code: 49-2091	
Avionics Technician		RAPIDS Code: 0464	
Job Title: Avionics Technician			
Level:		Specialization:	
Stackable Program: ___Yes ___No			
Base Occupation Name:			
Company Contact:			
Address:		Phone:	Email:
Apprenticeship Type: <input checked="" type="checkbox"/> Competency Based <input type="checkbox"/> Time Based <input type="checkbox"/> Hybrid		Prerequisites:	

Job Function 1: Maintains safety, health, and professionalism at work			
Competencies	Core or Optional	RTI	OJT
A. Recognizes safety, health, industrial, and environmental requirements in all departments	Core		
B. Reliably follows others' instructions	Core		
C. Willingly asks questions about things not fully understood	Core		
D. Establishes a system of maintaining appropriate notes and reminders and completes any required logs, calibration records, etc.	Core		
E. Ensures proper communications between previous and next shifts, with operations and with supervision	Core		
F. Identifies problems and changes that could lead to problems by exchanging information with operators, supervisors, and others	Core		

G. Establishes trust and rapport with operators, supervisors, and others	Core		
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Job Function 2: Follows company and regulatory guidelines

Competencies	Core or Optional	RTI	OJT
A. Identifies points of contact within and outside of the organization	Core		
B. Reads, comprehends, and follows company policies, procedures, operations, and guidelines	Core		
C. Reads, comprehends, and follows regulatory guidelines applicable to the operation, servicing, and maintenance of the aircraft	Core		

Job Function 3: Locates and uses technical data

Competencies	Core or Optional	RTI	OJT
A. Reads, comprehends, and applies the information contained within installation and service documents	Core		
B. Reads, comprehends, and applies the information contained within engineering and certification drawings and documents	Core		
C. Reads, comprehends, and applies the information contained within applicable regulatory documents	Core		

Job Function 4: Demonstrates ground operation and servicing to include protection of employer and customer assets

Competencies	Core or Optional	RTI	OJT
A. Follows company guidelines for asset protection	Core		
B. Identifies typical ground operation hazards	Core		
C. Conducts preliminary visual aircraft inspection	Core		
D. Services the electrical systems	Core		
E. Marshals and secures the aircraft	Core		
F. Starts and operates the aircraft	Core		
G. Taxis the aircraft	Core		
H. Uses tie-down procedures	Core		

Job Function 5: Identifies and uses tools and test equipment

Competencies	Core or Optional	RTI	OJT
A. Demonstrates knowledge of appropriate common hand tools for use in installation and maintenance	Core		
B. Demonstrates knowledge of appropriate specialty tools for use in installation and maintenance	Core		
C. Demonstrates knowledge of test equipment for maintenance and installation of avionics systems	Core		

Job Function 6: Performs electrical system calculations and analysis

Competencies	Core or Optional	RTI	OJT
A. Knows and identifies basic facts and general principles about basic circuits	Core		
B. Performs calculations and analysis of basic circuit performance	Core		
C. Troubleshoots basic circuits	Core		

Job Function 7: Installs and maintains electrical wiring harnesses, electronic components, and instruments

Competencies	Core or Optional	RTI	OJT
A. Adheres to safety practices and procedures for aircraft electrical and electronic power systems	Core		
B. Fabricates, installs, and maintains electrical wiring harnesses	Core		
C. Installs, maintains, and troubleshoots instruments	Core		
D. Interprets electrical control and power schematics to ensure the operation of the system and its components	Core		
E. Measures voltage, current, and resistance in an electrical circuit to verify system operation and power levels	Core		
F. Selects, installs, and tests circuit protection devices	Core		

Job Function 8: Fabricates, modifies, and repairs aircraft structures

Competencies	Core or Optional	RTI	OJT
A. Identifies and selects aircraft hardware and materials	Core		

B. Selects, installs, and removes fasteners to include rivets	Core		
C. Forms layout and bends sheet metal	Core		
D. Inspects and repairs composite and nonmetallic structures	Core		
E. Understands and applies bonding techniques and practices on metallic and nonmetallic structures	Core		
F. Fabricates and installs doublers, shelves, brackets, bracing, and support	Core		
G. Installs antennas using proper techniques, bonding, and cable routing	Core		

Job Function 9: Performs operational checks of aircraft systems and components

Competencies	Core or Optional	RTI	OJT
A. Follows safety procedures	Core		
B. Applies external power to aircraft and systems	Core		
C. Identifies and properly operates specialty test equipment for avionics and instrument system operation	Core		
D. Knows and understands applicable regulatory requirements for operational testing	Core		
E. Follows operational checkout procedures in equipment installation manual	Core		

Job Function 10: Diagnoses and troubleshoots malfunctions and operational problems

Competencies	Core or Optional	RTI	OJT
A. Identifies and locates appropriate technical data for troubleshooting	Core		
B. Reads, understands, and follows technical data for troubleshooting	Core		
C. Knows and understands fault isolation	Core		
D. Identifies malfunctioning equipment and systems	Core		

Job Function 11: Designs and integrates avionics system installations

Competencies	Core or Optional	RTI	OJT
A. Understands and specifies equipment required for types of aircraft operations	Core		
B. Identifies current aircraft avionics systems configuration	Core		

C. Reads drawings and interprets symbols and systems schematics	Core		
D. Knows and understands common avionics systems (communications, navigation, surveillance)	Core		
E. Determines wiring interface for a particular avionics installation	Core		
F. Maintains knowledge of installation techniques, including those required for instruments, radios, antennas, annunciator(s), and displays	Core		
G. Creates or updates electrical load analysis	Core		

Job Function 12: Configures avionics equipment and manages databases and software

Competencies	Core or Optional	RTI	OJT
A. Identifies configuration software and database requirements for the equipment	Core		
B. Configures equipment in accordance with the manufacturer's data and customer preferences	Core		
C. Connects configuration device to aircraft equipment	Core		
D. Loads and manages software and databases	Core		

Job Function 13: Prepares, updates, and maintains maintenance records, installation, and repair work

Competencies	Core or Optional	RTI	OJT
A. Documents the maintenance or alteration per regulatory guidelines	Core		
B. Updates and maintains weight and balance records	Core		
C. Updates and maintains aircraft equipment list	Core		
D. Creates or updates Instructions for Continued Airworthiness (ICA), Flight Manual Supplement (FMS), and others	Core		
E. Updates work order and maintenance records	Core		

Cross-Cutting Competencies

COMPETENCY**		0	1	2	3	4	5	6	7	8
Personal Effectiveness	Interpersonal Skills									
	Integrity									
	Professionalism									
	Initiative									
	Dependability and Reliability									
	Adaptability and Flexibility									
	Lifelong Learning									
Academic	Reading									
	Writing									
	Mathematics									
	Science and Technology									
	Communication									
	Critical and Analytical Thinking									
	Basic Computer Skills									
Workplace	Teamwork									
	Customer Focus									
	Planning and Organization									
	Creative Thinking									
	Problem Solving and Decision Making									
	Working with Tools and Technology									
	Checking, Examining, and Recording									
	Business Fundamentals									
	Sustainable									
	Health and Safety									

** The names of the cross-cutting competencies come from the US Department of Labor's Competency Model Clearinghouse, and definitions for each can be viewed at <https://www.careeronestop.org/CompetencyModel/competency-models/building-blocks-model.aspx>.

Cross-cutting competencies identify transferable skills—sometimes called “soft skills” or “employability skills”—that are important for workplace success, regardless of a person’s occupation. Still, the relative importance of specific cross-cutting competencies differs from occupation to occupation. The cross-cutting competencies table, above, provides information about which of these competencies is most important to be successful in a particular occupation. This information can be useful to employers or intermediaries in screening and selecting candidates for apprenticeship programs, or to pre-apprenticeship providers who seek to prepare individuals for successful entry into an apprenticeship program.

The scoring system utilized to evaluate competency levels required in each cross-cutting skill aligns with the recommendations of the Lumina Foundation’s Connecting Credentials Framework. The framework can be found at <http://connectingcredentials.org/wp-content/uploads/2015/05/ConnectingCredentials-4-29-30.pdf>.

Detailed Job Functions

Job Function 1: Maintains safety, health, and professionalism at work

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> Company policies and hierarchy 	<ul style="list-style-type: none"> Using proper procedures when working Maintaining situational awareness Logical thinking Clear oral communication Identifying problems and correcting them Teamwork 	<ul style="list-style-type: none"> None

Competency A: Recognizes safety, health, industrial, and environmental requirements in all departments	Core or Optional
PERFORMANCE CRITERIA	
1. Wears protective eyewear, footwear, hearing-protection devices, etc., as necessary	Core
2. Observes employer's requirements for preventing injuries	Core
3. Identifies location of first-aid equipment, including first-aid kits, safety showers, eyewash stations, fire blankets, defibrillators, and related equipment and uses them promptly and appropriately when necessary	Core
4. Maintains situational awareness, especially as equipment is being moved throughout the building or plant	Core
5. Follows other applicable OSHA or employer safety regulations	Core

Competency B: Reliably follows others' instructions	Core or Optional
PERFORMANCE CRITERIA	
1. Follows supervisors' instructions and offers constructive feedback to ensure proper completion of tasks	Core

Competency C: Willingly asks questions about things not fully understood	Core or Optional
PERFORMANCE CRITERIA	
1. Asks about techniques, components, installation, technical aspects, and other key areas of the job that are not fully clear	Core

Competency D: Establishes a system of maintaining appropriate notes and reminders and completes any required logs, calibration records, etc.	Core or Optional
PERFORMANCE CRITERIA	
1. Writes and records the information critical for proper job function	Core
2. Types information into easily accessible computer filing systems	Core

Competency E: Ensures proper communications between previous and next shifts, with operations and with supervision	Core or Optional
PERFORMANCE CRITERIA	
1. Demonstrates appropriate interpersonal skills with a supervisor or team leader and other team members to ensure work is smoothly continued from one shift to the next	Core

Competency F: Identifies problems and changes that could lead to problems by exchanging information with operators, supervisors, and others	Core or Optional
PERFORMANCE CRITERIA	
1. Analyzes the problem(s) and proposes remedies when authorized to carry them out	Core

Competency G: Establishes trust and rapport with operators, supervisors, and others	Core or Optional
PERFORMANCE CRITERIA	
1. Interfaces with team members to discuss work and any issues that may arise	Core

Job Function 2: Follows company and regulatory guidelines

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> Applicable government regulations Company policies and hierarchy 	<ul style="list-style-type: none"> Using proper procedures when working Maintaining situational awareness Logical thinking Clear oral communication Identifying problems and correcting them Teamwork 	<ul style="list-style-type: none"> None

Competency A: Identifies points of contacts within and outside of the organization	Core or Optional
PERFORMANCE CRITERIA	
1. Identifies and speaks to supervisors and managers of various internal departments (quality, engineering, accountable manager)	Core
2. Identifies and speaks to contacts from regulatory authorities	Core

Competency B: Reads, comprehends, and follows company policies, procedures, operations, and guidelines	Core or Optional
PERFORMANCE CRITERIA	
1. Reads and understands repair station manual, quality control manual, and/or other company operating and policy guidelines	Core
2. Follows company guidelines when operating or servicing an aircraft	Core

Competency C: Reads, comprehends, and follows regulatory guidelines applicable to the operation, servicing, and maintenance of the aircraft	Core or Optional
PERFORMANCE CRITERIA	
1. Reads and understands applicable Federal Aviation Administration regulations	Core
2. Reads and understands applicable US Department of Transportation regulations	Core
3. Follows regulatory guidelines when operating, servicing, and maintaining aircraft	Core

Job Function 3: Locates and uses technical data

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • Applicable government regulations • Company manuals and guides • Equipment manufacturer publications 	<ul style="list-style-type: none"> • Using proper procedures when working • Maintaining situational awareness • Logical thinking • Clear oral communication • Identifying problems and correcting them • Teamwork 	<ul style="list-style-type: none"> • None

Competency A: Reads, comprehends, and applies the information contained within installation and service documents	Core or Optional
PERFORMANCE CRITERIA	
1. Reads and understands all installation manuals and instructions before installation	Core
2. Follows all instructions and cautions laid out in the documentation	Core

Competency B: Reads, comprehends, and applies the information contained within engineering and certification drawings and documents	Core or Optional
PERFORMANCE CRITERIA	
1. Reads engineering and certification drawings and documents	Core
2. Interprets information within drawings and documents to perform maintenance or installations	Core

Competency C: Reads, comprehends, and applies the information contained within applicable regulatory documents	Core or Optional
PERFORMANCE CRITERIA	
1. Reads and understands applicable Federal Aviation Administration (14CFR) regulations, advisory circulars, and airworthiness directives	Core
2. Reads and understands applicable US Department of Transportation (49CFR) regulations	Core

3. Follows regulations and guidance material	Core
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Job Function 4: Demonstrates ground operation and servicing to include protection of employer and customer assets

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • AFM/POH guidelines • Aircraft control systems • Ground Power Units 	<ul style="list-style-type: none"> • Using proper procedures when working • Maintaining situational awareness • Logical thinking • Clear oral communication • Identifying problems and correcting them • Teamwork 	<ul style="list-style-type: none"> • Aircraft controls

Competency A: Follows company guidelines for asset protection	Core or Optional
PERFORMANCE CRITERIA	
1. Protects aircraft from damage while performing any ground operations	

Competency B: Identifies typical ground operation hazards	Core or Optional
PERFORMANCE CRITERIA	
1. Understands risk of personal injury	
2. Understands risk of aircraft damage	
3. Understands risks related to refueling and defueling, vehicle collision, and fire	
4. Maintains situational awareness while working on the ground to avoid hazards	

Competency C: Conducts preliminary visual aircraft inspection	Core or Optional
PERFORMANCE CRITERIA	
1. References AFM/POH checklist to conduct inspection in accordance with the particular manufacturer	
2. Inspects cabin door for structural damage	
3. Inspects interior of the cabin or cockpit for issues with carpeting, seat belts, seats, and windows	

4. Inspects switches, locks, gear controls, fuel selectors, avionics master, and circuit breakers for correct positioning	
5. Checks that flight instruments read correctly	
6. Checks that lights are operating	
7. Checks for any leaks	
8. Checks for other areas of concern	

Competency D: Services the electrical systems	Core or Optional
PERFORMANCE CRITERIA	
1. Connects Ground Power Unit (GPU) to provide power to an aircraft while on the ground	Core
2. Properly connects or disconnects aircraft battery	Core

Competency E: Marshals and secures the aircraft	Core or Optional
PERFORMANCE CRITERIA	
1. Applies marshalling signals to direct aircraft to park	Core
2. Conducts a post-flight inspection of the aircraft	Core
3. Secures flight controls	Core
4. Puts security locks in place	Core

Competency F: Starts and operates the aircraft	Core or Optional
PERFORMANCE CRITERIA	
1. Follows approved engine start checklist in the aircraft's AFM/POH	Core
2. Clears ramp area before engine start and turns on necessary lights	Core
3. Activates starter while applying brakes	Core
4. Manipulates throttle/fuel mixture as appropriate to operate the engine	Core
5. Monitors oil pressure and other critical engine instruments	Core
6. Stays attentive for unusual sounds, smells, vibrations, or smoke while operating aircraft	Core

Competency G: Taxi the aircraft	Core or Optional
PERFORMANCE CRITERIA	
1. Follows checklist specified by AFM/POH	Core
2. Maintains situational awareness while taxiing	Core
3. Watches outside the airplane while taxiing	Core
4. Keeps the aircraft centered on the taxiway at all times	Core

5. Maintains safe taxiing speed and slows down before turning	Core
6. Applies appropriate controls when taxiing in wind conditions	Core
7. Checks that flight instruments work properly while taxiing	Core
8. Follows AFM/POH shutdown checklist to shut down the engine	Core

Competency H: Uses tie-down procedures	Core or Optional
PERFORMANCE CRITERIA	
1. Ties down aircraft using chains	Core
2. Ties down aircraft using ropes	Core
3. Adds additional safety and security measures such as pitot tube covers and window sunscreens	Core
4. Ties down aircraft with sufficient space so it is free from any impact to or from the hangar or other aircraft	Core

Job Function 5: Identifies and uses tools and test equipment

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • Installation and maintenance techniques • Specialty tooling usage • Avionics equipment 	<ul style="list-style-type: none"> • Using proper procedures when working • Maintaining situational awareness • Logical thinking • Clear oral communication • Identifying problems and correcting them • Teamwork 	<ul style="list-style-type: none"> • Common hand tools • Specialty tools • Test equipment

Competency A: Demonstrates knowledge of appropriate common hand tools for use in installation and maintenance		Core or Optional
PERFORMANCE CRITERIA		
1. Accurately uses measurement tools such as tapes, rules, squares, and dividers before and during the fabrication process		Core
2. Identifies and properly uses general purpose tools such as hammers, mallets, screwdrivers, wrenches, and pliers		Core
3. Safely and accurately uses cutting tools such as knives, punches, files, hand drills, reamers, and hacksaws		Core
4. Accurately uses power tools such as pneumatic tools and electric tools, taking proper extra safety precautions		Core
5. Properly cares for common hand tools		Core

Competency B: Demonstrates knowledge of appropriate specialty tools for use in installation and maintenance		Core or Optional
PERFORMANCE CRITERIA		
1. Uses different methods of heat application for soldering (soldering iron, resistance soldering, torch soldering, dip soldering, etc.) as well as different soldering irons and tips		Core
2. Follows procedures and safety precautions for soldering		Core
3. Uses magnifiers to work with small objects or close tolerances		Core
4. Cuts wires and uses wire strippers and manual/ratcheting wire-crimping tools to properly terminate wires		Core

Competency C: Demonstrates knowledge of test equipment for maintenance and installation of avionics systems	Core or Optional
PERFORMANCE CRITERIA	
1. Practices general safety precautions for working with electrical circuits	Core
2. Correctly uses ammeters, voltmeters, ohmmeters, and multimeters to measure voltage, resistance, and current of a circuit	Core
3. Uses oscilloscopes to measure frequencies and voltages	Core
4. Tests the continuity of a circuit using meters	Core

Job Function 6: Performs electrical system calculations and analysis

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> Basic circuit knowledge Basic mathematics Circuit diagrams and drawings 	<ul style="list-style-type: none"> Using proper procedures when working Maintaining situational awareness Logical thinking Clear oral communication Identifying problems and correcting them Teamwork 	<ul style="list-style-type: none"> Electrical measuring equipment

Competency A: Knows and identifies basic facts and general principles about basic circuits	Core or Optional
PERFORMANCE CRITERIA	
1. Demonstrates understanding of the atom and the behaviors of charged particles	Core
2. Demonstrates understanding of magnetism and its effect on electrical equipment	Core
3. Demonstrates understanding of electrical charges, voltage, electric current, electrical resistance, and conductance	Core
4. Names and identifies different types of DC circuits (series, parallel, combination, and bridge circuits)	Core

Competency B: Performs calculations and analysis of basic circuit performance	Core or Optional
PERFORMANCE CRITERIA	
1. Constructs graphs to analyze basic circuits	Core
2. Calculates resistance, voltage, current, and power	Core
3. Calculates power consumption, power conversion, and efficiency of basic circuits	Core
4. Solves combination circuit problems using equivalent circuits	Core

Competency C: Troubleshoots basic circuits	Core or Optional
PERFORMANCE CRITERIA	

1. Locates open circuits using both visual inspection and meters	Core
2. Locates shorted/open resistors using meters	Core
3. Locates shorted/open capacitors using meters	Core
4. Locates shorted/open inductors using meters	Core
5. Compares calculations of working circuits with measurements of actual circuits to determine discontinuities	Core
6. Makes repairs to correct circuit problems and tests the success of these repairs	Core

Job Function 7: Installs and maintains electrical wiring harnesses, electronic components, and instruments

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> Electrical power systems Safety equipment and usage Aircraft radios and instruments Common hand tools Specialty tools Test equipment 	<ul style="list-style-type: none"> Using proper procedures when working Maintaining situational awareness Logical thinking Clear oral communication Identifying problems and correcting them Teamwork 	<ul style="list-style-type: none"> Safety equipment Circuits Common hand tools Specialty tools Meters and test equipment

Competency A: Adheres to safety practices and procedures for aircraft electrical and electronic power systems	Core or Optional
PERFORMANCE CRITERIA	
1. Wears and uses proper safety equipment such as gloves, glasses, and safety mats	Core
2. Keeps the area around electrical work or equipment clear and free of flammable substances	Core
3. Uses lockout/tagout devices	Core
4. De-energizes circuits and equipment before performing maintenance	Core

Competency B: Fabricates, installs, and maintains electrical wiring harnesses	Core or Optional
PERFORMANCE CRITERIA	
1. Determines proper wire size and circuit protection device based on current to be carried, system voltage, length of wire, and mechanical strength as applicable.	Core
2. Uses wiring diagrams and properly terminates wires to build electrical harness for avionics system installation	Core
3. Identifies wires and spliced connections throughout installation	Core
4. Combs and twists wires to install and only bends wires to the appropriate minimum radius	Core
5. Installs wiring so that it is mechanically and electrically sound, properly supported, and neat in appearance	Core
6. Protects wiring harnesses against chafing; high temperatures; damage by moving personnel or cargo; spillage of battery acids, solvents, or fluids; and abrasion in wheel wells	Core

Competency C: Installs, maintains, and troubleshoots instruments		Core or Optional
PERFORMANCE CRITERIA		
1. Demonstrates knowledge of different types of aircraft instruments and their uses		Core
2. Installs and removes front-mounted, rear-mounted, and clamp-mounted instruments in the instrument panel		Core
3. Inspects instruments for excessive errors, loose or cracked covers, light operation, and movement and operation of knobs		Core
4. Routinely inspects mounting, markings, and cases for operation and deterioration		Core
5. Troubleshoots problems by inspecting instruments for faults, removing faulty instruments, and replacing them		Core

Competency D: Interprets electrical control and power schematics to ensure the operation of the system and its components		Core or Optional
PERFORMANCE CRITERIA		
1. Understands electrical schematics for circuits of different types		Core
2. Determines what would constitute normal operation for a system causing problems		Core
3. Uses test equipment to test and isolate problems in circuit components		Core
4. Makes necessary repairs and tests to confirm the problem was resolved		Core

Competency E: Measures voltage, current, and resistance in an electrical circuit to verify system operation and power levels		Core or Optional
PERFORMANCE CRITERIA		
1. Uses voltmeters to measure voltage in an electrical circuit		Core
2. Uses ammeters to measure current in an electrical circuit		Core
3. Uses ohmmeters to measure resistance in an electrical circuit		Core
4. Uses measurements of voltage, current, and resistance to confirm whether a system is operating correctly or whether it needs repairs		Core

Competency F: Selects, installs, and tests circuit protection devices		Core or Optional
PERFORMANCE CRITERIA		
1. Identifies different fuse and circuit breaker types		Core

2. Follows proper safety precautions when installing and replacing fuses and circuit breakers	Core
3. Tests for open fuses using visual inspection, fuse indicators, and meters	Core

Job Function 8: Fabricates, modifies, and repairs aircraft structures

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • Aircraft hardware • Bonding techniques • Fabrication techniques 	<ul style="list-style-type: none"> • Using proper procedures when working • Maintaining situational awareness • Logical thinking • Clear oral communication • Identifying problems and correcting them • Teamwork 	<ul style="list-style-type: none"> • Fasteners and rivets • Sheet metal • Metallic and nonmetallic structures • Doublers, shelves, brackets, bracing, and support • Antennas

Competency A: Identifies and selects aircraft hardware and materials	Core or Optional
PERFORMANCE CRITERIA	
1. Identifies hardware by mechanical strength, current to be carried, and ease of installation	Core
2. Selects hardware material and finish depending on material of structure to which attachment is made	Core
3. Selects material of jumper and terminal specified by the bonding or grounding connection	Core

Competency B: Selects, installs, and removes fasteners to include rivets	Core or Optional
PERFORMANCE CRITERIA	
1. Selects proper studs, nuts, washers, and cable clamps	Core
2. Makes stud connections, nut plate and bolt connections, and nut and bolt connections	Core
3. Makes connections to tabs riveted to the structure rather than the actual structure when bonding leads will carry high current	Core
4. Replaces rivets only with larger rivets	Core

Competency C: Forms layout and bends sheet metal	Core or Optional
PERFORMANCE CRITERIA	
1. Accurately measures and marks metal for cutting, drilling, and welding	Core

2. Correctly uses common layout tools (scribers, squares, protractors, etc.)	Core
3. Fabricates edges, joints, seams, and notches in sheet metal	Core
4. Bends sheet metal using forming tools	Core

Competency D: Inspects and repairs composite and nonmetallic structures	Core or Optional
PERFORMANCE CRITERIA	
1. Maintains composite and nonmetallic materials with proper care	Core
2. Inspects parts to determine type, size, and location of damage	Core
3. Consults applicable structural repair manual (SRM) when making repairs	Core
4. Removes and replaces damaged parts	Core

Competency E: Understands and applies bonding techniques and practices on metallic and nonmetallic structures	Core or Optional
PERFORMANCE CRITERIA	
1. Selects appropriate hardware for bonding	Core
2. Cleans bonding surfaces thoroughly before making connections	Core
3. Makes bonding connections to flat and cylindrical surfaces of basic structures using different types of bolted and jumper connections	Core
4. Tests resistance after making bonds	Core
5. Refinishes surfaces after making a connection	Core

Competency F: Fabricates and installs doublers, shelves, brackets, bracing, and support	Core or Optional
PERFORMANCE CRITERIA	
1. Uses proper sheet metal forming equipment to fabricate doublers	Core
2. Bends metal using proper sheet metal forming equipment to fabricate brackets and shelves	Core
3. Properly uses bracing and supports when making and repairing structures	Core

Competency G: Installs antennas using proper techniques, bonding, and cable routing	Core or Optional
PERFORMANCE CRITERIA	
1. Mounts antennas where signal can be transmitted and received	Core
2. Prepares surfaces for proper bonding	Core
3. Mounts antennas to flat surfaces, constructing doubler plates when necessary	Core

4. Protects antenna from moisture after mounting	Core
5. Tests bonding after antenna installation	Core
6. Routes antenna cabling appropriately to avoid physical damage and electrical/magnetic interference	Core

Job Function 9: Performs operational checks of aircraft systems and components

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> Aircraft instruments Aircraft operational procedures Ground power units Specialty test equipment Regulatory requirements Equipment manufacturer publications 	<ul style="list-style-type: none"> Using proper procedures when working Maintaining situational awareness Logical thinking Clear oral communication Identifying problems and correcting them Teamwork 	<ul style="list-style-type: none"> Aircraft systems Specialty test equipment

Competency A: Follows safety procedures	Core or Optional
PERFORMANCE CRITERIA	
1. Refers to aircraft's pilot operating handbook (POH) operations checklist	Core
2. Demonstrates familiarity with aircraft emergency procedures	Core
3. Identifies and uses proper safety equipment while performing checks	Core
4. Maintains communication with controllers as necessary while performing checks	

Competency B: Applies external power to aircraft and systems	Core or Optional
PERFORMANCE CRITERIA	
1. Ensures that the aircraft is in a safe configuration before applying power	Core
2. Follows appropriate procedure to apply external power	Core
3. Applies external power and operates the aircraft's electrical/avionics systems	Core

Competency C: Identifies and properly operates specialty test equipment for avionics and instrument system operation	Core or Optional
PERFORMANCE CRITERIA	
1. Demonstrates proper operation of pitot/static test set	Core
2. Demonstrates proper operation of transponder ramp tester	Core
3. Demonstrates proper operation of navigation systems ramp tester	Core

Competency D: Knows and understands applicable regulatory requirements for operational testing		Core or Optional
PERFORMANCE CRITERIA		
1. Demonstrates knowledge of FAR 91.411 or other instrument system testing requirements		Core
2. Demonstrates knowledge of FAR 91.413 or other transponder system testing requirements		Core

Competency E: Follows operational checkout procedures in equipment installation manual		Core or Optional
PERFORMANCE CRITERIA		
1. Identifies correct section of the installation manual to perform operational checks		Core
2. Reads description and operation sections of installation manual		Core
3. Follows procedures identified in the manual		Core

Job Function 10: Diagnoses and troubleshoots malfunctions and operational problems

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • Troubleshooting techniques • Aircraft schematics • Fault isolation 	<ul style="list-style-type: none"> • Using proper procedures when working • Maintaining situational awareness • Logical thinking • Clear oral communication • Identifying problems and correcting them • Teamwork 	<ul style="list-style-type: none"> • Aircraft systems • Meters and test equipment

Competency A: Identifies and locates appropriate technical data for troubleshooting	Core or Optional
PERFORMANCE CRITERIA	
1. Knows procedures in avionics and aircraft systems troubleshooting guides	Core
2. Knows troubleshooting procedures in avionics manufacturer's installation manuals, component maintenance manuals, and service literature	Core
3. Knows troubleshooting procedures in aircraft maintenance manuals	Core

Competency B: Reads, understands, and follows technical data for troubleshooting	Core or Optional
PERFORMANCE CRITERIA	
1. Properly reads and interprets schematics, procedures, and other diagrams	Core
2. Correctly uses troubleshooting trees and other troubleshooting guides	Core
3. Follows troubleshooting flow diagrams to isolate malfunction	Core

Competency C: Knows and understands fault isolation	Core or Optional
PERFORMANCE CRITERIA	
1. Understands importance of fault isolation	Core
2. Knows proper test procedures to locate and isolate faulty parts	Core
3. Uses schematics to isolate problems to one part of a circuit	Core
4. Analyzes symptoms of malfunction using the maintenance manual, service bulletins, schematics, and other tools	Core

Competency D: Identifies malfunctioning equipment and systems	Core or Optional
PERFORMANCE CRITERIA	
1. Visually inspects equipment for problems	Core
2. Checks the condition of fuses and circuit breakers	Core
3. Correctly uses measuring equipment such as meters and oscilloscopes	Core
4. Performs operational test procedures	Core
5. Conducts appropriate bench tests on units	Core
6. Interprets results from test and measuring equipment	Core
7. Determines if faulty parts need to be repaired or replaced	Core
8. Focuses on isolated component to fix malfunction	Core

Job Function 11: Designs and integrates avionics system installations

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • Equipment specifications • Systems schematics • Common avionics systems • Installation techniques • Aircraft lighting systems • Reading and interpretation • Electrical load analysis 	<ul style="list-style-type: none"> • Using proper procedures when working • Maintaining situational awareness • Logical thinking • Clear oral communication • Identifying problems and correcting them • Teamwork 	<ul style="list-style-type: none"> • Aircraft systems

Competency A: Understands and specifies equipment required for types of aircraft operations	Core or Optional
PERFORMANCE CRITERIA	
1. Identifies different types of systems and equipment	Core
2. Demonstrates knowledge of aircraft operations (VFR, IFR)	Core
3. Correctly matches equipment to specific operations	Core

Competency B: Identifies current aircraft avionics systems configuration	Core or Optional
PERFORMANCE CRITERIA	
1. Plans, lays out, and configures avionics and instruments for installation	Core
2. Determines mechanical fits and clearances	Core
3. Identifies avionics and instruments location requirements	Core
4. Knows and understands instrument lighting requirements	Core

Competency C: Reads drawings and interprets symbols and systems schematics	Core or Optional
PERFORMANCE CRITERIA	
1. Understands different types of diagrams and drawings	Core
2. Understands basic system, part, and component identifiers	Core
3. Recognizes and interprets symbols on diagrams and schematics	Core
4. Recognizes and interprets different lines on drawings	Core

Competency D: Knows and understands common avionics systems (communications, navigation, surveillance)		Core or Optional
PERFORMANCE CRITERIA		
1. Knows and understands different forms of aviation communication systems, such as VHF, HF and satellite		Core
2. Knows and understands different forms of aviation navigation systems such as GPS/WAAS, VOR, ILS, and LORAN, as well as how systems calculate position and directions		Core
3. Knows and understands how different surveillance systems, such as transponder and ADS-B/FANS, that keep aircraft connected to air traffic control		Core

Competency E: Determines wiring interface for a particular avionics installation		Core or Optional
PERFORMANCE CRITERIA		
1. Determines equipment compatibility in the installation		Core
2. Creates block diagrams		Core
3. Creates basic wiring diagrams		Core

Competency F: Maintains knowledge of installation techniques, including those required for instruments, radios, antennas, annunciator(s), and displays		Core or Optional
PERFORMANCE CRITERIA		
1. Knows the installation manual and other important data and documentation		Core
2. Knows wire and cable cutting and preparation		Core
3. Knows different types of connectors		Core
4. Knows bonding and grounding techniques		
5. Knows installation techniques for electrical hardware and wire support		
6. Knows installation techniques for mechanical hardware, bracing, and support		
7. Knows antenna installation requirements, procedures, and practices		

Competency G: Creates or updates electrical load analysis		Core or Optional
PERFORMANCE CRITERIA		
1. Checks for prior documented electrical load analysis		Core
2. Calculates electrical load during different aircraft processes for each phase of flight		Core
3. Calculates electrical load for emergency operations		Core
4. Documents new or updated electrical load analysis in aircraft records		Core

Job Function 12: Configures avionics equipment and manages databases and software

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> • Computer interfaces and peripherals • Applications and software 	<ul style="list-style-type: none"> • Using proper procedures when working • Maintaining situational awareness • Logical thinking • Clear oral communication • Identifying problems and correcting them • Teamwork 	<ul style="list-style-type: none"> • Maintenance computer

Competency A: Identifies configuration software and database requirements for the equipment	Core or Optional
PERFORMANCE CRITERIA	
1. Understands the difference between database and software	Core
2. Determines configuration method (maintenance laptop, desktop, wireless device)	Core
3. Determines software versions required per installation documentation	Core
4. Determines required databases for the installation	

Competency B: Configures equipment in accordance with the manufacturer's data and customer preferences	Core or Optional
PERFORMANCE CRITERIA	
1. Sets configuration parameters for particular installation	Core
2. Sets optional configuration parameters based on customer preferences	Core
3. Records avionics system configuration in aircraft records	Core

Competency C: Connects configuration device to aircraft equipment	Core or Optional
PERFORMANCE CRITERIA	
1. Connects maintenance computer and installs appropriate software drivers	Core
2. Connects wireless device via wifi or Bluetooth	Core

3. Uses and installs information technology applications to properly connect configuration device	Core
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Competency D: Loads and manages software and databases	Core or Optional
PERFORMANCE CRITERIA	
1. Loads correct version of software for the particular installation	Core
2. Loads required databases for the particular installation	Core
3. Verifies software and databases were loaded correctly	Core

Job Function 13: Prepares, updates, and maintains maintenance records, installation, and repair work

Related Technical Instruction		
KNOWLEDGE	SKILLS	TOOLS & TECHNOLOGIES
<ul style="list-style-type: none"> Mathematical calculations Aircraft instructions Regulatory authority requirements for maintenance records Installation approval documentation 	<ul style="list-style-type: none"> Using proper procedures when working Maintaining situational awareness Logical thinking Clear oral communication Identifying problems and correcting them Teamwork 	<ul style="list-style-type: none"> Aircraft systems Work order system Aircraft logs and records

Competency A: Documents the maintenance or alteration per regulatory guidelines	Core or Optional
PERFORMANCE CRITERIA	
1. Follows guidelines of regulatory authorities to record applicable maintenance action or alteration	Core
2. Updates flight and maintenance manuals upon completion of aircraft alterations	Core

Competency B: Updates and maintains weight and balance records	Core or Optional
PERFORMANCE CRITERIA	
1. Calculates or measures aircraft's empty weight	Core
2. Calculates or measures aircraft's empty weight center of gravity	Core
3. Documents weight and balance according to FAA guidelines and documentation	Core

Competency C: Updates and maintains aircraft equipment list	Core or Optional
PERFORMANCE CRITERIA	
1. Records installed components and parts in an equipment list	Core
2. Ensures that equipment list meets the requirements of the original Type Certificate or approved altered conditions	Core
3. Identifies any equipment that may be inoperative at any time to ensure legal flight	Core

Competency D: Creates or updates Instructions for Continued Airworthiness (ICA), Flight Manual Supplement (FMS), and others	Core or Optional
PERFORMANCE CRITERIA	
1. Creates or updates ICA with instructions for any required maintenance, installation, or operation of installed components to maintain airworthiness of equipment	Core
2. Maintains records for installations per company policy	Core
3. Adds and updates FMS in AFM/POH checklist for installed or modified equipment	Core

Competency E: Updates work order and maintenance records	Core or Optional
PERFORMANCE CRITERIA	
1. Records all maintenance performed	Core
2. Keeps records for each aircraft and work item as appropriate	Core
3. Creates logbook entries for aircraft records	Core

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