



Maintenance Support Workforce Category

LOGISTICS COMMUNITY OF INTEREST

2854 ELECTRICAL EQUIPMENT REPAIRING SERIES
Competency-Based Learning Map and Training Strategy

Electrical Equipment Repairing Competency-Based Learning Map Overview

The United States Marine Corps (USMC) Logistics Community of Interest (COI) developed this competency-based learning map to support 2854 Electrical Equipment Repairing series professional development of technical competencies and training. This learning map is organized by a group of competencies, which together define successful performance in the 2854 Electrical Equipment Repairing series. Competency-based learning maps are essential resources for career development and useful for identifying the knowledge and skillsets needed to meet and/or enhance their skills in this occupational series. Learning maps are comprised of several components, described in Table 1 below:

Table 1. Components of a Competency-Based Learning Map

Competency Titles and Definitions	Describe the capabilities required within a position or job role
Proficiency Target Levels	Define different levels of required performance (Entry, Journeyman, Expert) within a competency area
Behavioral Indicators (BIs)	Examples of activities performed by an individual that illustrate how a competency is demonstrated at varying levels of proficiency: Entry, Journeyman, and Expert
Training	<p>Mandatory: Training required to be completed based on Federal, State, or Marine Corps requirements/regulations</p> <p>Recommended: Core, Core-Plus, and Sustainment training identified to enhance performance in competency areas</p> <ul style="list-style-type: none"> • Fundamental: Training highly recommended for new Logisticians. • Core: Initial training that all personnel should have in related position from entry to senior levels • Core-Plus: Advanced training that is necessary for career progression that all mid-senior personnel should have in addition to the core training. Core-Plus training is recommended for personnel from Wage Grade (WG) 8 to Wage Leader/Wage Supervisor (WL/WS) 12 • Sustainment: Training intended to maintain credentials or • Career Enhancing: A good training course to have, but not necessary for career advancement

Electrical Equipment Repairing Series Defined

This series covers nonsupervisory jobs involved in troubleshooting, testing, installing, repairing, overhauling, modifying, and maintaining electrical devices, equipment, and components such as automatic alternator synchronizing equipment, amplidyne control units, voltage regulating equipment, generators, actuators, switching and control panels, junction boxes, AC and DC motors, electrical harnesses, transformers, and power amplifiers. Typically, the equipment and components serviced have been removed from aircraft, ships, ground support or industrial equipment, tracked or wheeled heavy duty vehicles, missiles, etc. The work requires knowledge of electrical circuitry, formulas, and principles and their application to the devices, equipment, components, and systems repaired. In addition, some work may require knowledge of electronic circuitry and theory and general mechanical skills and knowledge.

Competency Areas

Four competencies have been identified for the successful performance in the 2854 series:

1. Maintain and Repair Equipment
2. Electrical Drawings and Documentation
3. Electrical Equipment Repair
4. Troubleshooting (electrical)

Proficiency and Skill Band Definitions

The Proficiency Rating Scale (Table 2) below details the rating given for each level of proficiency and its corresponding definition. Proficiency levels describe the degree of competency required to perform a specific job successfully; these levels relate to the work required for a specific job. Different jobs require different levels of proficiency for successful performance. The proficiency levels provided in this learning map indicate the minimum proficiency target for successful performance.

Table 2. Proficiency Rating Scale

1	Basic	No Proficiency	Conceptual Knowledge Only/No Experience
2	Applied	Low Proficiency	Able to Apply with Help
3	Intermediate	Moderate Proficiency	Able to Apply Autonomously
4	Advanced	High Proficiency	Proficient/Able to Help Others
5	Expert	Very High Proficiency	Expert Knowledge

The USMC COIs have outlined a career progress structure that more accurately reflects the change in your abilities and responsibilities over time. That structure is called the Skill Level Structure (Table 3). It is associated with each occupational series and follows you from the time you are an entry-level employee until you attain the level of a management employee. Career progress in the USMC has traditionally been based on the federal government pay schedule system. The ratings within the pay schedule system are associated with Job Skill Levels within the 2854 series indicated as follows:

Table 3. Skill Level Structure

Job Skill Level	Definition	Pay Plan	Beginning Grade	Target Grade
1	Entry	WG	7	7
2	Journeyman	WG	8	10
3	Expert	WL/WS	10	12

Behavioral Indicators (BIs)

It is important to define how competencies are manifested at different skill levels. Behavioral Indicators are on-the-job examples of behaviors and activities that illustrate how a competency is demonstrated at varying skill levels and provide an objective description of the behavior that can be observed in an individual as evidence that they either have or do not have the skills at the required level needed for the competency. These are examples of what the competency could look like at varying skill levels and are not inclusive of all behaviors demonstrating the competency for each skill level. This information is provided as a tool to help guide evaluations of employee proficiency; however, it should not be used as a checklist for employees' behaviors.

Certifications and Training

Certifications are a practical option for formalizing a specific competency or skillset. The Logistics COI has identified several certifications (Table 4) that are applicable to the 2854 series. While these certifications are not required, staff are encouraged to complete these programs to improve and formalize their skillsets. However, some certifications below may be required according to your command and billet. Work with your supervisor to ensure you meet command certification training requirements.

Table 4. Certifications

Certification / Program	Vendor
Associate Electronics Technician (CETa)	Electronics Technicians Association, International (ETA-I)
Automobile/Light Truck - Electrical/Electronic Systems (A6)	National Institute for Automotive Service Excellence (ASE)
Basic Electricity and Electronics - Alternating Current (BEE-AC)	Certifying Technical Employee Competence (CertTEC)
Basic Electricity and Electronics - Analog (BEE-A)	CertTEC
Basic Electricity and Electronics - Digital (BEE-D)	CertTEC
Basic Electricity and Electronics - Direct Current (BEE-DC)	CertTEC
Certified Electronics Technician - Associate-Level	International Society of Certified Electronics Technicians (ISCET)
Certified Electronics Technician - Journeyman-Level - Industrial	ISCET
Electronics Associate AC (EM2)	ETA-I
Electronics Associate Analog (EM3)	ETA-I
Electronics Associate Comprehensive (EM5)	ETA-I
Electronics Associate DC (EM1)	ETA-I
Electronics Associate Digital (EM4)	ETA-I

Industrial Electronics Technician (IND)	ETA-I
Medium/Heavy Truck - Electrical/Electronic Systems (T6)	ASE

The Core, Core-Plus, and Career Enhancing training courses found in Tables 5-7 and Appendix A are recommended and may not be inclusive of all training available. These courses are aligned to competencies throughout the learning map. Training titles and vendors are subject to change as the courses evolve. Additionally, several external resources (Defense Acquisition University (DAU), MarineNet, Learning Tree, Lynda.com, etc.) provide a variety of training opportunities available to all personnel for professional knowledge and skill enhancement.

Table 5. 2854 Core Training (All Levels)

Core Training	
<ul style="list-style-type: none"> • Basic Electronics • Electronics Foundations: Basic Circuits • Huntron Analog Signature Analysis (ASA) Training Course • Huntron Tracker Training Workshop (Two days) • Job Hazard Analysis 	<ul style="list-style-type: none"> • J-STD-001 Soldering • Precision Electrical Measurement • Reading Blueprints • Reading Schematics and Symbols

Table 6. 2854 Core-Plus Training (WG/WL/WS 8-12)

Core-Plus Training	
<ul style="list-style-type: none"> • Advanced Electronics 	<ul style="list-style-type: none"> • Advanced Soldering

Table 7. 2854 Career Enhancing

Career Enhancing Training	
<ul style="list-style-type: none"> • 104-3 Electronics for Non-Electronic Engineers • AUMF 1150 Introduction to Robotics 	<ul style="list-style-type: none"> • ISO 9001 Internal Auditor

Competency Model

A competency model is a group of competencies that together define successful performance in a particular occupation. The Logistics COI has adapted this model from the Department of the Navy (DON) Office of Civilian Human Resources (OCHR) for the 2854 series. The competency model, to include definitions, corresponding BIs, minimum proficiency target levels, and training has been provided in the charts below.

COMPETENCY	DEFINITION		
1. Maintain and Repair Equipment	Uses and maintains hand tools and related equipment to inspect, test, repair, or adjust electrical/electronic equipment.		
MINIMUM PROFICIENCY TARGET LEVELS			
Job Skill Level 1: Entry WG 7	Job Skill Level 2: Journeyman WG 8	Job Skill Level 3: Expert WL/WS 10-12	
2	3	4	
BEHAVIORIAL INDICATORS			
Entry	<ul style="list-style-type: none"> • Uses knowledge and understanding of tools and materials needed for electrical equipment repair. • Follows instructions on the operation of hand and electrical tools to accomplish assigned work. • Uses soldering equipment for electrical repair. • Maintains daily tool accountability of tools and test equipment. • Uses hand tools (e.g., screwdrivers, pliers, snips, hammers, cable cutters, wire strippers, heat guns, power tools) to perform required electrical work. • Uses precision instruments used for quantitative measures (e.g., multimeters, power supplies, calipers, signature analyzers). 		
Journeyman	<ul style="list-style-type: none"> • Determines tools and materials needed for electrical equipment repair. • Instructs technicians on the operation of hand and electrical tools, and test equipment to accomplish assigned work and maintain a safe work area. • Guides technicians and uses soldering equipment for electrical repair. • Maintains daily tool accountability of tools and test equipment. • Uses hand tools (e.g., screwdrivers, pliers, snips, hammers, cable cutters, wire strippers, heat guns, power tools) to perform required electrical work. • Uses precision instruments used for quantitative measures (e.g., multimeters, power supplies, calipers, signature analyzers). 		
Expert	<ul style="list-style-type: none"> • Determines and orders tool and material requirements needed for electrical equipment repair to ensure compliance. • Instructs technicians on the operation of hand and electrical tools, and test equipment to accomplish assigned work and maintain a safe work area. • Guides technicians and uses soldering equipment for electrical repair. • Conducts quarterly toolbox inspections. • Uses hand tools (e.g., screwdrivers, pliers, snips, hammers, cable cutters, wire strippers, heat guns, power tools) to perform required electrical work. • Uses precision instruments used for quantitative measures (e.g., multimeters, power supplies, calipers, signature analyzers). 		

COMPETENCY	DEFINITION		
2. Electrical Drawings and Documentation	Reads and interprets electrical drawings and documentation to inspect, troubleshoot, repair, and assemble electrical/electronic equipment.		
MINIMUM PROFICIENCY TARGET LEVELS			
Job Skill Level 1: Entry WG 7		Job Skill Level 2: Journeyman WG 8	Job Skill Level 3: Expert WL/WS 10-12
2		3	4
BEHAVIORAL INDICATORS			
Entry	<ul style="list-style-type: none"> • Interprets, understands, and uses diagrams, drawings, technical manuals, and other instructions to repair electrical/electronic equipment. • Refers to drawings, letters, schematics, technical data, and other instructions to make repairs to electrical equipment. • Reviews drawings, standard work instructions, or shop procedures to verify electrical equipment repair work is performed according to requirements and specifications. • Uses modification instructions to install and test components (e.g., generators, electrical control circuits). • Works from wiring diagrams and drawings to plan the routing and placement of electrical lines and circuits for installation. 		
Journeyman	<ul style="list-style-type: none"> • Interprets and uses diagrams, drawings, technical manuals, and other instructions to repair electrical/electronic equipment. • Refers to drawings, letters, schematics, technical data, and other instructions to make repairs to electrical equipment. • Reviews drawings, standard work instructions, or shop procedures to verify electrical equipment repair work is performed according to requirements and specifications. • Uses modification instructions to install and test components (e.g., generators, electrical control circuits). • Works from wiring diagrams and drawings to plan the routing and placement of electrical lines and circuits for installation. 		
Expert	<ul style="list-style-type: none"> • Ensures that all documentation (e.g., diagrams, drawings, technical manuals, and other instructions) is current and approved. • Guides technicians on the proper use of all related electrical drawing documentation. • Identifies and communicates drawing and process discrepancies. • Reviews drawings, letters, emails, schematics, technical data, and other instructions and ensures all technicians are in compliance. • Reviews drawings, standard work instructions, or shop procedures to verify electrical equipment repair work is performed according to requirements and specifications. • Uses modification instructions to oversee, install and test components (e.g., generators, electrical control circuits). • Performs in-process and post-completion inspections of electrical equipment repairs and modifications. • Utilizes charts, work orders, production schedules, or other records and reports to determine production requirements. 		

COMPETENCY	DEFINITION		
3. Electrical Equipment Repair	Inspects, tests, and repairs electrical components (e.g., electrical assemblies and subassemblies) in support of tactical and engineering equipment. Works with end items, components, and/or accessories, performing assembly, disassembly, installation, testing, maintenance, repair, troubleshooting, and modifying. Examples include: Wiring, motors, control and regulating equipment, monitoring circuits, generators, electro-mechanical, fire suppression systems, crimping, test stands.		
MINIMUM PROFICIENCY TARGET LEVELS			
Job Skill Level 1: Entry WG 7		Job Skill Level 2: Journeyman WG 8	Job Skill Level 3: Expert WL/WS 10-12
2		3	4
BEHAVIORIAL INDICATORS			
Entry	<ul style="list-style-type: none"> Assembles, disassembles, repairs, tests, and performs authorized modifications on electrical components (e.g., generators, starters, electrical harnesses and cables, electric motors, control panels) with supervision. Verifies interconnecting wiring and cabling of repaired components to determine if installation or repair was correctly done. Inspects electrical, electronic, or electro-mechanical components during removal, repair, or installation. Follows safety protocol. Replaces worn electro-mechanical items or parts to complete electrical equipment repairs. Fabricates electrical boxes, cables and harnesses, subassemblies, or test boxes using materials of conducting, resisting, or electrical properties with supervision. Sets up and operates computer-controlled automatic test equipment (ATE) to run diagnostic programs. Uses an infrared temperature sensing device for diagnosing hot spots on mechanical systems. Informs work leader of electrical equipment deficiencies requiring engineering resolution. 		
Journeyman	<ul style="list-style-type: none"> Determines the type of electrical repair work needed. Assembles, disassembles, repairs, and performs authorized modifications on electrical components (e.g., generators, starters, electrical harnesses and cables, electric motors, control panels). Verifies interconnecting wiring and cabling of repaired components to determine if installation or repair was correctly done. Conducts final tests on electrical components. Demonstrates repair techniques of electrical equipment to assist apprentice technicians. Inspects electrical, electronic, or electro-mechanical components during removal, repair, or installation. Instructs apprentice technicians on the installation of electrical equipment to conform to established standards and the implementation of new or improved electrical equipment repair techniques. Follows safety protocol. Repairs defects in equipment with a voltage range of 110 to 480 AC volts and microvolts to 480 DC volts. Replaces worn electro-mechanical items or parts to complete electrical equipment repairs. Fabricates electrical boxes, cables and harnesses, subassemblies, or test boxes using materials of conducting, resisting, or electrical properties and provides to apprentice technician. Sets up and operates computer-controlled ATE to run diagnostic programs. Uses an infrared temperature sensing device for diagnosing hot spots on mechanical systems. Informs work leader of electrical equipment deficiencies requiring engineering resolution. 		
Expert	<ul style="list-style-type: none"> Determines and assigns priorities of electrical equipment repair work based upon skill level and capability. Maintains compliance of electrical component repairs and ensured safety protocols are followed. Conducts detailed checks during critical points in the electrical equipment repair or installation process. Conducts inspections and final tests on electrical components. 		

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| | <ul style="list-style-type: none">• Demonstrates repair techniques of electrical equipment to assist apprentice technicians.• Inspects the workmanship of electrical equipment repairs to verify defects or discrepancies are corrected accordingly.• Instructs apprentice technicians on the installation of electrical equipment to conform to established standards and the implementation of new or improved electrical equipment repair techniques.• Coordinates with program management to estimate total man hour requirements.• Fabricates electrical boxes, cables and harnesses, subassemblies, or test boxes using materials of conducting, resisting, or electrical properties and ensures product compliance.• Prepares Quality Inspection Reports for non-conformance.• Sets up and operates computer-controlled ATE to run diagnostic programs.• Uses an infrared temperature sensing device for diagnosing hot spots on mechanical systems. |
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COMPETENCY	DEFINITION		
4. Troubleshooting (electrical)	Locates malfunctioning circuits, components, etc., using approved test equipment within the functional system, and determines method of repair. Performs tests and repairs to bring asset back to manufacturer's specifications.		
MINIMUM PROFICIENCY TARGET LEVELS			
Job Skill Level 1: Entry WG 7	Job Skill Level 2: Journeyman WG 8	Job Skill Level 3: Expert WL/WS 10-12	
2	3	4	
BEHAVIORIAL INDICATORS			
Entry	<ul style="list-style-type: none"> • Conducts initial visual or diagnostic inspections or tests to identify issues and isolate sources of failure with supervision if needed. • Evaluates the condition of components, equipment, and circuits. • Troubleshoots malfunctions to the lowest circuit element through point-to-point circuit checks to identify faulty components for replacement or repair. • Diagnoses malfunctions in electrical systems or equipment to determine repairs or parts needed. • Tests cables, wiring, and connections to verify integrity. 		
Journeyman	<ul style="list-style-type: none"> • Conducts initial visual or diagnostic inspections or tests to identify issues and isolate sources of failure. • Evaluates the condition of components, equipment, and circuits. • Troubleshoots malfunctions to the lowest circuit element through point-to-point circuit checks to identify faulty components for replacement or repair. • Diagnoses malfunctions in electrical systems or equipment to determine repairs or parts needed. • Tests cables, wiring, and connections to verify integrity. • Conducts final visual or diagnostic inspections or tests to identify issues with electrical systems and equipment. 		
Expert	<ul style="list-style-type: none"> • Conducts final visual or diagnostic inspections or tests to ensure repair of defective electrical systems and equipment. • Conducts visual and diagnostic inspections to identify and isolate trends in electrical systems or equipment. 		

Appendix A. Training-to-Competency Mapping

CORE TRAINING	VENDOR	Maintain & Repair Equipment	Electrical Drawings & Documentation	Electrical Equipment Repair	Trouble-shooting (electrical)
Basic Electronics	Local	√	√	√	√
Electronics Foundations: Basic Circuits	Lynda.com	√	√	√	√
Huntron Analog Signature Analysis (ASA) Training Course	Huntron	√	√	√	√
Huntron Tracker Training Workshop (Two days)	Huntron	√	√	√	√
Job Hazard Analysis	Command Safety Division	√	√	√	√
J-STD-001 Soldering	Command QA Division	√	√	√	√
Precision Electrical Measurement	Workplace Training	√	√	√	√
Reading Blueprints	TPC Training	√	√	√	√
Reading Schematics and Symbols	TPC Training	√	√	√	√

CORE-PLUS TRAINING	VENDOR	Maintain & Repair Equipment	Electrical Drawings & Documentation	Electrical Equipment Repair	Trouble-shooting (electrical)
Advanced Electronics	Local	√	√	√	√
Advanced Soldering	Command QA Division	√	√	√	√

CAREER ENHANCING TRAINING	VENDOR	Maintain & Repair Equipment	Electrical Drawings & Documentation	Electrical Equipment Repair	Trouble-shooting (electrical)
104-3 Electronics for Non-Electronic Engineers	Technology Training, Inc	√	√	√	√
AUMF 1150 Introduction to Robotics	Albany Tech	√	√	√	√
ISO 9001 Internal Auditor	Various Vendors	√	√	√	√

Appendix B. Acronyms Defined

◆ ASE	National Institute for Automotive Service Excellence
◆ ATE	Automatic Test Equipment
◆ BI	Behavioral Indicator
◆ CerTEC	Certifying Technical Employee Competence
◆ COI	Community of Interest
◆ CPI	Continuous Process Improvement
◆ DAU	Defense Acquisition University
◆ DoD	Department of Defense
◆ DON	Department of Navy
◆ ETA-I	Electronics Technicians Association, International
◆ ISCET	International Society of Certified Electronics Technicians
◆ OCHR	Office of Civilian Human Resources
◆ SOP	Standard Operating Procedure
◆ USMC	United States Marine Corps
◆ WD	Wage Determination
◆ WG	Wage Grade
◆ WL	Wage Leader
◆ WS	Wage Supervisor