



Australian Government

Department of Education, Employment and Workplace Relations

MEA274A Maintain basic light aircraft electrical systems and components

Revision Number: 2

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Modification History

Minor formatting and editorial changes made.

Unit Descriptor

This unit of competency is part of the Avionic Certificate IV (Aircraft Maintenance Stream) training pathway. It covers the competencies required for the maintenance of electrical systems of the more basic types of both fixed and rotary wing aircraft. Where a CASA licensing outcome is sought this unit forms part of the CASA requirement for the granting of the applicable Aircraft Maintenance Engineer Licence under CASR Part 66, in accordance with the licensing provisions in Section 3, Assessment Guidelines.

Application of the Unit

This unit requires application of hand skills and the use of maintenance documentation/publications in the maintenance of basic aircraft electrical systems and components involving inspection, limited testing and troubleshooting and component removal and installation.

Applications include fixed wing aircraft with fixed undercarriage and basic rotary wing aircraft with skids or floats and no powered flight controls powered by either a normally aspirated piston engine or small gas turbine.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEA246C Fabricate and/or repair aircraft electrical components or parts

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

1. Inspect basic aircraft electrical systems and components
 - 1.1. Relevant maintenance documentation and modification status, including system reports, where relevant, are used to identify specific inspection requirements
 - 1.2. Isolation tags are checked and aircraft configured for safe system inspection in accordance with the applicable maintenance manual
 - 1.3. **DC electrical system** is visually or physically checked for external signs of damage in accordance with applicable maintenance manual
 - 1.4. Defects are correctly identified and reported
2. Test/adjust basic aircraft electrical systems
 - 2.1. Aircraft and system are prepared in accordance with applicable maintenance manual for application of power/system operation
 - 2.2. Electrical system is functionally tested, in accordance with maintenance manual, for signs of serviceability or malfunction
 - 2.3. System calibration or adjustments are performed in accordance with maintenance manual, where appropriate
3. Troubleshoot basic aircraft electrical systems
 - 3.1. Available information from maintenance documentation and inspection and test results are used, where necessary, to assist in fault determination
 - 3.2. Maintenance manual fault diagnosis guides and logic processes are used to identify faults and accurate **troubleshooting**
 - 3.3. Specialist advice is obtained, where required, to assist with the troubleshooting
 - 3.4. System faults are located and the causes of the faults are clearly identified and recorded in maintenance documentation, where required, and in accordance with applicable enterprise procedures
 - 3.5. Rectification requirements are determined
4. Remove and install basic aircraft electrical system components
 - 4.1. System is rendered safe and prepared in accordance with the applicable maintenance manual and isolation tags are fitted where necessary to ensure personnel safety
 - 4.2. **Electrical component** removal is carried out in accordance with the applicable maintenance manual
 - 4.3. Required maintenance documentation is completed and processed in accordance with standard enterprise procedures
 - 4.4. Removed components are tagged and packaged in accordance with specific enterprise procedures
 - 4.5. Electrical components to be installed are checked to confirm correct part number, modification status, serviceability and shelf life
 - 4.6. Physical installation of electrical components is performed in accordance with applicable maintenance manual, ensuring appropriate adjustment/alignment with mechanical components is carried out
 - 4.7. System is reinstated to correct operational condition in preparation for testing
 - 4.8. Required maintenance documentation is completed and processed in accordance with standard enterprise procedures

Required Skills and Knowledge

Required skills

Look for evidence that confirms skills in:

- applying relevant OHS practices, including those relating to gas turbine engine high energy ignition units
- using approved maintenance documentation and aircraft publications relating to DC electrical systems
- identifying/locating:
 - DC power generation, regulation, distribution and control systems and components:
 - generators and starter/generators
 - regulators
 - bus bars
 - circuit breakers and fuses
 - wiring
 - piston engine ignition and starting systems and components:
 - magnetos or coils
 - starter motors
 - ignition switches/start switches
 - ignition harnesses
 - low tension wiring
 - spark plugs
 - auxiliary starting devices
 - gas turbine engine ignition and starting systems:
 - starter motors and starter/generators
 - high energy ignition units
 - control units
 - switches
 - batteries and associated mounting equipment, including related anti-vibration aids
 - motors and actuators in basic DC electrical systems
- correctly connecting DC generators, alternator/rectifier generators and starter/generators
- recognising system and component defects/external damage, correct installation, connection of plugs, terminations, attaching hardware (including cabling/harnesses) and security in:
 - DC power generation systems including regulation, distribution and control
 - battery installations
 - piston engine ignition and starting systems
 - gas turbine engine ignition and starting systems (where applicable to the enterprise)
 - internal/external lighting systems, including controls
 - motors and actuators in basic DC electrical systems
- applying logic processes, taking and interpreting electrical measurements, using test

equipment and appropriate wiring diagrams and manuals to isolate malfunctions in the above systems

- performing system functional tests and checks to isolate system faults and assess post-maintenance serviceability

Required knowledge

Look for evidence that confirms knowledge of:

- component attachment methods
- connection of hardware and plugs
- DC electrical principles:
 - properties of permanent magnets
 - precautions for the care and storage of permanent magnets
 - properties of electromagnets
 - primary and secondary cells
 - aircraft battery types, construction, care and safety
 - resistor characteristics
 - fuses and circuit breakers
 - fundamental DC circuits
 - inductive circuits
 - capacitive circuits
 - basic fault-finding principles
- general construction, operating characteristics and applications for aircraft:
 - DC generators
 - alternator/rectifier generators
 - DC motors including starter motors
 - starter/generators
 - DC actuators (linear and rotary)
 - gas turbine high energy ignition system components and related safety precautions
 - lighting systems
- the basic layout (block diagram level), function and operation of the systems listed in the Range Statement
- electrical system maintenance requirements and troubleshooting procedures
- relevant OHS practices, including those relating to gas turbine engine high energy ignition units
- relevant maintenance manuals
- relevant regulatory requirements and standard procedures

Evidence Guide

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

<p>Overview of assessment</p>	<p>A person who demonstrates competency in this unit must be able to inspect, test and troubleshoot basic DC electrical systems and remove and install components, including looms, cables and connection hardware, while observing all relevant safety precautions.</p>
<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>The underlying skills inherent in this unit should be transferable across a range of inspection, testing and troubleshooting applications (including the timely involvement of supervisors or other trades) associated with basic aircraft DC electrical systems and components. It is essential that system testing procedures, cleanliness requirements and safety precautions applicable to the system being maintained are fully observed, understood and complied with, as well as work practices associated with electrostatic sensitive devices. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice is critical.</p> <p>Evidence of transferability of skills and knowledge related to inspection, testing and troubleshooting and component removal and installation is essential. This is to be demonstrated through application across a range of aircraft electrical systems and components listed in the Range Statement. The application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide before undertaking any action. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.</p> <p>A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements of the unit of competency are being achieved under routine supervision on electrical looms, cables and connection hardware, and on each system in Range Statement Groups 1 to 4 and on at least one major component/LRU in each case. For Group 5, competency may be demonstrated through the performance of a battery check. Component removal and installation competencies are to be demonstrated on at</p>

	least one component from each of groups 6 to 11. This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.
Context of and specific resources for assessment	Competency should be assessed in the work environment or simulated work environment using tools and equipment specified in maintenance documentation. It is also expected that general purpose tools and test equipment found in most routine situations would be used where appropriate.
Method of assessment	
Guidance information for assessment	

Range Statement

<p>The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.</p>	
Note	Range statements listed below are numbered to facilitate specification of the assessment requirements included in the Evidence Guide
Applicable electrical systems	<p>Electrical systems may include:</p> <ol style="list-style-type: none"> 1. DC power generation, regulation and distribution systems 2. Piston engine and gas turbine engine ignition and starting systems (as applicable to the enterprise) 3. DC electrical systems, such as flaps, including related motors and actuators 4. Aircraft lighting 5. Aircraft main battery
Troubleshooting	Troubleshooting involves the use of fault-finding charts or similar, to line replacement level
Applicable electrical components	<p>Electrical components include:</p> <ol style="list-style-type: none"> 6. DC generators, and alternator/rectifier generators, and components of related single generator regulation and distribution systems 7. Motors 8. Actuators 9. Piston engine ignition and starting system components 10. Aircraft batteries 11. Aircraft lighting components, such as bulbs, lenses, switches and rheostats
Application	<p>Application of this unit may relate to:</p> <ul style="list-style-type: none"> • scheduled or unscheduled maintenance • individual or team-related activities
Procedures and requirements	Refer to industry standard procedures specified by manufacturers, regulatory authorities or the enterprise

Unit Sector(s)

Aviation maintenance

Competency field

Co-requisite units

Not applicable