



Australian Government

Department of Education, Employment and Workplace Relations

MEA227C Test and troubleshoot aircraft electrical systems and components

Revision Number: 1

MEA227C Test and troubleshoot aircraft electrical systems and components

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit is part of the Avionic Certificate IV training pathways and is also part of the Mechanical Aircraft Maintenance Engineer licensing pathway. It covers the competencies required to test and troubleshoot electrical systems and components of 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 chosen B1 or the B2 Aircraft Maintenance Engineer Licence under CASR Part 66, in accordance with the licensing provisions in Section 3, Assessment Guidelines.
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Application of the Unit

Application of the unit	This unit requires application of hand skills and the use of system/component knowledge and applicable maintenance publications and test equipment to test and troubleshoot aircraft electrical systems and components. Applications include fixed and rotary wing aircraft.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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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

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for troubleshooting	1.1. Relevant maintenance documentation and modification status, including system defect reports, where relevant, are used to identify an unserviceability.
2. Test/adjust electrical systems.	2.1. Aircraft and system are prepared in accordance with applicable maintenance manual for the application of power/system operation. 2.2. Electrical system is functionally tested, in accordance with maintenance manual, for evidence of serviceability or malfunction. 2.3. System calibration or adjustments are performed in accordance with maintenance manual, as appropriate.
3. Troubleshoot electrical systems.	3.1. Available information from maintenance documentation and inspection and test results is used, where necessary, to assist in fault determination. 3.2. Maintenance manual fault diagnosis guides and logic processes are used to ensure efficient and accurate troubleshooting . 3.3. Specialist advice is obtained, where required, to assist with the troubleshooting process. 3.4. System faults are located and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required. 3.5. Rectification requirements are determined.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Look for evidence that confirms skills in:

- Application of relevant occupational health and safety (OHS) practices
- The use of approved maintenance documentation and aircraft publications relating to the electrical system being maintained
- Recognition of system and electrical component defects/external damage, correct installation, connection of plugs, terminations, attaching hardware (including cabling/harnesses) and security in:
 - AC and DC power generation systems including regulation, distribution, control and cooling
 - battery installations
 - flight control and/or electro-hydraulic systems
 - engine ignition; starting; fuel distribution and control systems
 - internal/external lighting systems, including controls
 - landing gear systems
 - antiskid braking systems
 - auxiliary systems (including ice/rain protection, fire detection, environmental control and pressurisation, water and waste, doors, propeller control, equipment and furnishings)
 - equipment cooling and ventilation systems
 - master caution and warning systems
- Applying logic processes, taking and interpreting electrical measurements, using test equipment and appropriate wiring diagrams and manuals to isolate electrical system malfunctions of the above components and 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
- Explaining the basic layout (block diagram level), function and operation of:
 - AC and DC power generation systems including regulation, distribution, control and cooling
 - battery installations
 - flight control and/or electro-hydraulic systems

REQUIRED SKILLS AND KNOWLEDGE

- engine ignition; starting; fuel distribution and control systems
- internal/external lighting systems, including controls
- landing gear systems
- antiskid braking systems
- auxiliary systems (including ice/rain protection, fire detection, environmental control and pressurisation, water and waste, doors, propeller control, equipment and furnishings)
- equipment cooling and ventilation systems
- master caution and warning systems
- Explaining basic principles/functions, relating to systems listed above and associated with:
 - basic AC and DC circuit theory
 - digital fundamentals
 - analogue fundamentals
 - AC and DC generator characteristics
 - single and polyphase AC motors and DC motors
 - rotary and static inverters
 - air cycle air conditioning
 - electrical sensing and transmitting devices

Evidence Guide

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.

Overview of assessment

A person who demonstrates competency in this unit must be able to test and troubleshoot DC and AC electrical systems and components, including looms, cables and connection hardware, while observing all relevant safety precautions

Critical aspects for assessment and evidence required to demonstrate competency in this unit

The underlying skills inherent in this unit should be transferable across a range of testing and troubleshooting applications (including the timely involvement of supervisors or other trades) associated with aircraft 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. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice is critical.

Evidence of transferability of skills and knowledge related to testing and troubleshooting 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.

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 a system and at least one item from each of Groups 1 to 14, including a battery check in the case of Group 14 (Groups 15 to 17 may be omitted where they are not applicable to the enterprise) in the Range Statement. 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 workplace or simulated workplace using tools and equipment specified in the maintenance manuals. It is also expected that general and special purpose tools, test and ground support equipment would be used where appropriate
Method of assessment	
Guidance information for assessment	

Range Statement

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	<p>Range statements listed below are numbered to facilitate specification of the assessment requirements included in the Evidence Guide.</p>
Electrical systems and components	<p><i>Electrical systems may include the following electrical systems and components, including all related electrical hardware, looms and cables:</i></p> <ol style="list-style-type: none"> 1. AC and/or DC power generation, regulation and distribution systems 2. Rotary and static inverters and TR units 3. Air cycle air conditioning and pressurisation systems 4. Flight and engine control systems 5. Ignition and starting systems 6. Fire/smoke detection and extinguishing 7. Lighting (internal and external) 8. Master and caution warning systems 9. Equipment cooling and ventilation 10. Equipment and furnishing 11. Position indicating systems 12. Fuel storage and distribution 13. Landing gear indication and antiskid 14. Main batteries and battery bus ties/interlocks 15. Propeller control systems 16. Ice and rain protection 17. Waste water
Troubleshooting	<p><i>Troubleshooting</i> involves the use of fault finding charts or similar, to line replacement level.</p>
Application	<p>Application of this unit may relate to:</p> <ul style="list-style-type: none"> • Scheduled or unscheduled maintenance activities • Individual or team related activities
Procedures and requirements	<p>Refer to industry standard procedures specified by manufacturers, regulatory authorities or the</p>

RANGE STATEMENT

	enterprise
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Unit Sector(s)

Unit sector	
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Competency field

Competency field	Aviation maintenance
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Co-requisite units

Co-requisite units		
	MEA223C	Inspect aircraft electrical systems and components