Australian Government

MEA719 Evaluate aircraft electrical systems

Release: 1

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Modification History

Release 1 - New unit of competency

Application

This unit of competency applies to aircraft alternating current (AC) and direct current (DC) electrical systems, including power generation, control and distribution circuits and lighting systems. It involves evaluation of systems for compliance with design and performance standards and with airworthiness regulatory requirements within both civil and military environments.

Also covered is documentation of the evaluation process within management systems, such as configuration management (CM) and integrated logistic support (ILS).

It is suitable for people working as paraprofessionals within aircraft design teams, within the engineering departments of aircraft maintenance organisations or employed within Continuing Airworthiness Management Organisations (CAMOs) and Approved Engineering Organisations (AEOs), and for those pursuing qualifications or careers in those fields.

This unit is used in workplaces that operate under the airworthiness regulatory systems of the Australian Defence Force (ADF) and the Civil Aviation Safety Authority (CASA).

Pre-requisite Unit

MEA726 Apply aircraft electrical system design techniques

Competency Field

Avionic engineering

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.
1.	Prepare to evaluate aircraft electrical system	1.1 Confirm and apply safe electrical working practice
		1.2 Review the effects of electricity on humans and identify dangerous high currents and voltages and regulatory requirements related to extra low, low and

			high voltage applications and relate these to aircraft electrical system operation and maintenance
		1.3	Determine parameters and context of applications and purpose of evaluation
		1.4	Confirm personal functions and responsibilities, team and support functional group interdependencies and communications
		1.5	Confirm that tasks and responsibilities are appropriate to qualifications and delegations and that appropriate support, including technical and professional assistance, is available
		1.6	Determine chain of responsibility for the activity evaluation, reporting arrangements and timelines
		1.7	Identify work health and safety (WHS) and regulatory requirements with particular emphasis on safety, codes of practice, performance requirements and standards, including airworthiness regulatory requirements for aircraft electrical systems, risk management and organisational procedures
2.	Identify principles and techniques required for evaluation of aircraft electrical system	2.1	Identify features and functions of aircraft electrical AC and DC systems and components
		2.2	Review aircraft electrical system design and layout requirements and techniques
		2.3	Identify system power generation and control requirements
		2.4	Identify electrical distribution system circuit and protection requirements
		2.5	Identify interfaces with aircraft and avionic systems and their power requirements
		2.6	Identify internal and external aircraft lighting requirements
3.	Evaluate aircraft electrical system and system components	3.1	Evaluate proposed modifications to aircraft electrical systems and system components
		3.2	Evaluate aircraft electrical system and system component maintenance requirements
		3.3	Evaluate aircraft electrical system and system

			component reliability and defect history
		3.4	Evaluate proposed component substitutions
		3.5	Evaluate application for compliance with WHS Acts, regulations, codes, directives and standards/specifications, including those related to risk management
4.	Report results	4.1	Report results of scoping, principles and techniques identification and evaluation of applications
		4.2	Provide documentation, such as system schematics, wiring diagrams and data required by CM and/or ILS, and as required for compliance with airworthiness regulations

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Aircraft electrical systems include:

- AC power generation and control
- DC power generation and control
- Batteries
- Electrical power distribution circuits and circuit protection
- External lighting circuits
- Internal lighting circuits
- Electrical interfaces with aircraft systems, such as:
  - hydraulic
  - landing gear and brakes
  - doors
  - pneumatic
  - air conditioning and pressurisation
  - flight controls
  - engine controls

- anti-ice and de-ice
- fire detection and extinguishing

- Electrical interfaces with avionic systems, such as:
  - caution and warning
  - instrumentation
  - communications
  - navigation
  - pulse
  - on-board computer systems (e.g. automatic flight and engine control, flight management and on-board maintenance)
  - in-flight entertainment

Electrical system components include:

- Alternators, generators, inverters and transformer/rectifiers
- Batteries and emergency batteries
- Regulators and indicators, such as voltage, current and frequency
- Switches
- Relays
- Wiring and related hardware
- Fuses and circuit breakers
- Rheostats
- Rotary and linear actuators
- Lighting, including strobe lights
- Indication and warning lights

Standards and guidance material include:

- ASTM F2639-07 Standard Practices for Design, Alteration and Certification of Airplane Electrical Wiring Systems
- ARINC Report 609 Design Guidance for Aircraft Electrical Power Systems
- CASA AC 21-38(0) Aircraft Electrical Load Analysis and Power Source Capacity
- CASA AC 21-99 Aircraft Wiring and Bonding
- ADF AAP7001.054 Airworthiness Design Requirements Manual
- FAR Part 23 Airworthiness Standards for Airplanes in the Normal, Utility, Aerobatic or Commuter Categories
- FAR Part 25 Airworthiness Standards for Airplanes in the Transport Category
- FAR Part 27 Airworthiness Standards for Rotorcraft in the Normal Category
- FAR Part 29 Airworthiness Standards for Rotorcraft in the Transport Category

- EASA CS-23 Certification Specifications for Aeroplanes in the Normal, Utility, Aerobatic or Commuter Categories
- EASA CS-25 Certification Specifications for Airplanes in the Transport Category
- EASA CS-27 Certification Specifications for Rotorcraft in the Normal Category
- EASA CS-29 Certification Specifications for Rotorcraft in the Transport Category
- RTCA DO-160D Environmental Conditions and Test Procedures for Airborne Equipment
- Military Specification MIL-E-7016F: Electrical Load and Power Source Capacity, Aircraft, Analysis of
- SAE Aerospace AS50881 Wiring Aerospace Vehicles
- CASA AC21.16(0) Approval of material, parts, processes and appliances
- CASA AC21.145(0) Manufacture of parts during the course of maintenance
- CASA AC21.601(0) Australian Technical Standards Order Authorisation
- CASA CAAP35-7(0) Design approval of modifications and repairs
- FAA AC 43-13-1B Acceptable Methods, Techniques and Practices – Aircraft Inspection and Repair

Configuration management (CM)

- CM is a process for control and documentation of the design and development process and for the management of system, component and software throughout the service life

Integrated logistic support (ILS)

- ILS is an integrated approach to the management of logistic disciplines originally developed for the management of military systems from design concept to final disposal at life-of-type. It covers:
  - reliability engineering, maintainability engineering and maintenance planning
  - supply and support
  - support and test equipment
  - manpower and personnel
  - training and training support
  - technical data and publications
  - computer resources support
  - facilities
  - packaging, handling, storage and transportation
  - design interface

Appropriate technical and professional assistance includes:	• Assistance from individuals with CASA maintenance certification licenses or those with supervisory authorisations in the ADF regulatory system
	• Professional support from engineers employed within:
	  • organisations with CASA continuing airworthiness management or maintenance approvals
	  • approved engineering organisations under the ADF regulatory system
	• Engineers employed within organisations recognised by overseas airworthiness organisations

WHS, regulatory requirements and enterprise procedures include:	• WHS Acts and regulations • Relevant standards • Industry codes of practice • Risk assessments • Registration requirements • Safe work practices • Civil Aviation Safety Regulations (CASRs) • AAP7001.053 ADF Technical Airworthiness Management Manual • Overseas airworthiness authorities, where applicable, e.g. Federal Aviation Administration, Transport Canada, European Aviation Safety Agency

Unit Mapping Information

Release 1 – New unit based on MEM23096A Apply avionic system design principles and techniques in avionic engineering situations and MEM23096A Apply avionic system design principles and techniques in avionic engineering situations – units not equivalent

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ce216c9c-04d5-4b3b-9bcf-4e81d0950371