



Australian Government

MEA227 Test and troubleshoot aircraft electrical systems and components

Release: 2

MEA227 Test and troubleshoot aircraft electrical systems and components

Modification History

Release 2. Equivalent to MEA227 Test and troubleshoot aircraft electrical systems and components with amended prerequisite codes.

Application

This unit of competency 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 of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. Work may be performed individually or as part of a team.

The unit is part of the Avionic Certificate IV (Aircraft Maintenance Stream) training pathways and is also part of the Mechanical Aircraft Maintenance Engineer licensing pathway

The 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).

Where a CASA licensing outcome is sought this unit forms part of the CASA requirement for the granting of the chosen maintenance certification licence under Civil Aviation Safety Regulation (CASR) Part 66, in accordance with the licensing provisions in the Companion Volume Implementation Guide.

Pre-requisite Unit

MEA223 Inspect aircraft electrical systems and components

Competency Field

Aviation maintenance

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 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 while observing all relevant work health and safety (WHS) requirements |
| | | 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 to line replacement level |
| | | 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 |

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.

Electrical systems and components include:

- All related electrical hardware, looms and cables
- Alternating current (AC) and/or direct current (DC) power generation, regulation and distribution systems
- Rotary and static inverters and transformer rectifier (TR)

units

- Air cycle air conditioning and pressurisation systems
- Flight and engine control systems
- Ignition and starting systems
- Fire/smoke detection and extinguishing
- Lighting (internal and external)
- Master and caution warning systems
- Equipment cooling and ventilation
- Equipment and furnishing
- Position indicating systems
- Fuel storage and distribution
- Landing gear indication and anti-skid
- Main batteries and battery bus ties/interlocks
- Propeller control systems (where applicable to the enterprise)
- Ice and rain protection (where applicable to the enterprise)
- Wastewater (where applicable to the enterprise)
- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise

Procedures and requirements include:

Unit Mapping Information

Release 2. Equivalent to MEA227 Test and troubleshoot aircraft electrical systems and components

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ce216c9c-04d5-4b3b-9bcf-4e81d0950371>

Assessment Requirements for MEA227 Test and troubleshoot aircraft electrical systems and components

Modification History

Release 2. Equivalent to MEA227 Test and troubleshoot aircraft electrical systems and components with amended prerequisite codes.

Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

- applying relevant WHS practices
- using 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, and 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
 - anti-skid 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, and 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.

It is essential that system testing procedures, cleanliness requirements and safety precautions applicable to the electrical system being maintained are fully observed, understood and complied with. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice across a range of inspection, testing and troubleshooting applications (including the timely involvement of supervisors or other trades) 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 Assessment Conditions.

Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include 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
 - engine ignition, starting, fuel distribution and control systems
 - internal/external lighting systems, including controls
 - landing gear systems
 - anti-skid 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
- WHS requirements applicable to the maintenance of aircraft electrical systems, including gas turbine engine high-energy ignition units
- electrical system maintenance requirements and troubleshooting procedures
- relevant maintenance manuals
- relevant regulatory requirements and standard procedures.

Assessment Conditions

- Competency should be assessed in the workplace or simulated workplace using tools and equipment specified in the maintenance manuals. It is also expected that applicable general and special purpose tools, and test and ground support equipment would be used where appropriate.
- 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.
- The following conditions of assessment represent the requirements of the Regulators (ADF and CASA) and maintenance stakeholders and must be rigorously observed.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on a system and at least one (1) item from each of the following groups, including all related electrical hardware, looms and cables:
 - AC and/or DC power generation, regulation and distribution systems
 - rotary and static inverters and TR units
 - air cycle air conditioning and pressurisation systems
 - flight and engine control systems
 - ignition and starting systems
 - fire/smoke detection and extinguishing
 - lighting (internal and external)
 - master and caution warning systems
 - equipment cooling and ventilation
 - equipment and furnishing
 - position indicating systems
 - fuel storage and distribution
 - landing gear indication and anti-skid
 - main batteries and battery bus ties/interlocks (including a battery check)
 - propeller control systems (may be omitted if not applicable to the enterprise)
 - ice and rain protection (may be omitted if not applicable to the enterprise)
 - wastewater (may be omitted if not applicable to the enterprise).
- This shall be established via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide (for details refer to the Companion Volume Assessment Guidelines).
- Assessors must satisfy the requirements of the National Vocational Education and Training Regulator (Australian Skills Quality Authority, or its successors).
- Where the unit is to be used for CASA licensing purposes the Assessor must also meet the criteria specified in the CASR Part 147 Manual of Standards.

- Individuals being assessed who have already attained MEA294 Inspect, test and troubleshoot advanced aircraft electrical systems and components, will have covered a significant proportion of the Performance Criteria for Elements 1, 2 and 3 and will have covered many of the Range of Conditions variables. The Log of Industrial Experience and Achievement records relating to MEA294 Inspect, test and troubleshoot advanced aircraft electrical systems and components, may be accepted as also meeting the evidence requirements for this unit in the applicable areas.
- The relationship between MEA294 Inspect, test and troubleshoot advanced aircraft electrical systems and components, and MEA210 Inspect, test and troubleshoot basic aircraft electrical systems and components, may also be taken into account where MEA210 Inspect, test and troubleshoot basic aircraft electrical systems and components, has been attained, but not MEA294 Inspect, test and troubleshoot advanced aircraft electrical systems and components. Advice in MEA210 Inspect, test and troubleshoot basic aircraft electrical systems and components, regarding the coverage of MEA274 Maintain basic light aircraft electrical systems and components, may also be taken into consideration where applicable.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ce216c9c-04d5-4b3b-9bcf-4e81d0950371>