



**Australian Government**

# **MEA211 Inspect, test and troubleshoot advanced aircraft electrical systems and components**

**Release: 1**

# **MEA211 Inspect, test and troubleshoot advanced aircraft electrical systems and components**

## **Modification History**

Release 1 - New unit of competency

## **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 inspect, test and troubleshoot advanced aircraft electrical systems and components of fixed and rotary wing aircraft that have advanced electrical systems, 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 pathway 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**

|        |                                                                   |
|--------|-------------------------------------------------------------------|
| MEA203 | Remove and install advanced aircraft electrical system components |
| MEA246 | Fabricate and/or repair aircraft electrical components or parts   |

## **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. | Inspect advanced aircraft electrical systems and components | 1.1 | Relevant maintenance documentation and modification status, including system defect reports where relevant, are used to identify specific inspection requirements                                           |
|    |                                                             | 1.2 | Isolation tags are checked and aircraft configured for safe system inspection and operation in accordance with the applicable maintenance manual                                                            |
|    |                                                             | 1.3 | Electrical systems are visually or physically checked for external signs of defects in accordance with applicable maintenance manual while observing all relevant work health and safety (WHS) requirements |
|    |                                                             | 1.4 | Defects are correctly identified and reported                                                                                                                                                               |
| 2. | Test/adjust advanced aircraft 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 advanced aircraft 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, in accordance with standard enterprise procedures        |
|    |                                                             | 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 their components include:

- Direct current (DC) and alternating current (AC) power generation and distribution systems and components, including generators, alternators, starter generators and related control, regulation and distribution system components
- Transformer rectifier units and inverters
- Batteries and related bus tie or interlock system components and battery temperature monitoring systems
- Motors and actuators
- Components of gas turbine and/or piston engine ignition and starting systems (where applicable to the enterprise)
- External/internal lights
- Electrical components specific to systems, such as air cycle air conditioning, combustion heating, equipment cooling, anti-icing and de-icing, landing gear, anti-skid, flight control, master and central warning, fuel storage and distribution, fire warning and extinguishing and engine/propeller control

### Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise

## Unit Mapping Information

Release 1 – equivalent to MEA211C Inspect, test and troubleshoot advanced 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 MEA211 Inspect, test and troubleshoot advanced aircraft electrical systems and components**

## **Modification History**

Release 1 - New unit of competency

## **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 include:

- recognition of system and component defects/external damage, correct installation, connection of plugs, terminations, attaching hardware (including cabling/harnesses) and security in:
  - DC and AC power generation systems, including regulation, distribution and control
  - inverters (rotary and static)
  - battery installations, including temperature monitoring systems
  - gas turbine and piston engine ignition and starting systems (where applicable to the enterprise)
  - propeller systems
  - internal/external lighting systems, including controls
  - landing gear systems, including anti-skid
  - flight controls
  - fire warning and extinguishing
  - air cycle air conditioning and combustion heating systems
  - equipment cooling and ventilation
  - fuel storage and distribution
  - master and central warning
- applying logic processes, taking and interpreting electrical measurements, using test equipment and appropriate wiring diagrams and manuals to isolate electrical system malfunctions in the above systems
- performing system functional tests and checks to isolate system faults and assess post-maintenance serviceability
- applying WHS requirements applicable to the maintenance of aircraft electrical systems
- using approved maintenance documentation and aircraft publications relating to the electrical systems being maintained.

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.

## 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:

- the basic layout (block diagram level), function and operation of the following systems:
- DC and AC power multi-generator systems, including regulation, distribution and control
- inverters (rotary and static)
- battery installations, including temperature monitoring systems
- gas turbine and piston engine ignition and starting systems
- propeller systems
- internal/external lighting systems, including controls
- landing gear systems, including anti-skid
- flight controls
- fire warning and extinguishing
- air cycle air conditioning and combustion heating systems
- equipment cooling and ventilation
- fuel storage and distribution
- master and central warning
- explaining basic principles/functions, relating to the above systems and associated with:
  - basic DC and AC circuit theory
  - DC generator characteristics
  - alternator characteristics
  - starter generator characteristics
  - DC and AC motors
  - rotary and static inverter operation
- 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 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 of 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:
  - DC and AC power generation and distribution systems and components, including generators, alternators, starter generators and related control, regulation and distribution system components
  - transformer rectifier units and inverters
  - batteries and related bus tie or interlock system components and battery temperature monitoring systems
  - motors and actuators
  - components of gas turbine and/or piston engine ignition and starting systems (may be omitted if not applicable to the enterprise)
  - external/internal lights
  - electrical components specific to systems, such as air cycle air conditioning, combustion heating, equipment cooling, anti-icing and de-icing, landing gear, anti-skid, flight control, master and central warning, fuel storage and distribution, fire warning and extinguishing and engine/propeller control.
- 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 MEA210 Inspect, test and troubleshoot basic aircraft electrical systems and components will have covered inspection, testing and troubleshooting of DC power generation and DC systems and components. The Log of Industrial Experience and Achievement records relating to MEA210 Inspect, test and troubleshoot basic aircraft electrical systems and components may be accepted as also meeting the evidence requirements for this unit in the applicable areas.
- Advice in MEA210 Inspect, test and troubleshoot basic aircraft electrical systems and components regarding the coverage provided by MEA274 Maintain basic light aircraft electrical systems and components should also be taken into consideration if the individual has attained that unit rather than MEA210 Inspect, test and troubleshoot basic 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>