



Australian Government

Department of Education, Employment and Workplace Relations

MEA275A Maintain basic light aircraft instrument 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 instrument 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 system/component knowledge and applicable test equipment to inspect, test and troubleshoot basic aircraft instrument systems and to remove and install components. Applications include light 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 instrument 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. **Instrument system components** are visually or physically checked for external defects in accordance with applicable maintenance manual
 - 1.4. Defects are correctly identified and reported
2. Test/adjust basic aircraft instrument systems and components
 - 2.1. Aircraft and system are prepared in accordance with applicable maintenance manual application of power/system operation
 - 2.2. Instrument system is functionally tested in accordance with maintenance manual evidence of serviceability or malfunction
 - 2.3. System calibration or adjustments are performed in accordance with maintenance manual appropriate
3. Troubleshoot basic aircraft instrument systems and components
 - 3.1. Available information from maintenance documentation, inspection and test results where necessary, to assist in fault determination
 - 3.2. Maintenance manual fault diagnosis guides and logic processes are used to identify and accurate **troubleshooting**
 - 3.3. Specialist advice is obtained, where required, to assist with the troubleshooting
 - 3.4. Instrument 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
4. Remove and install basic aircraft instrument 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. Instrument 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 maintenance manual
 - 4.5. Instrument components to be installed are checked to confirm correct part identification, modification status, serviceability and shelf life
 - 4.6. Physical installation of instrument components is performed in accordance with applicable maintenance manual and regulatory requirements, ensuring appropriate adjustment/alignment 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:

- using approved maintenance documentation and aircraft publications relating to basic instrument systems
- locating and identifying flight instrument system components comprising:
 - engine system temperature, speed (including mechanical and electrical tachometers)
 - auxiliary direct reading systems including vacuum, fuel storage quantities
 - flight systems including attitude, altitude, air speed and OAT
- locating and identifying direct reading compasses
- correct handling and observance of maintenance precautions relating to gyroscopes, gimbals and pitot/static systems (connections, heating and protrusions)
- recognising system and component defects/external damage, correct installation, connection of plugs, terminations, attaching hardware (including cabling/harnesses) and security in:
 - flight instruments
 - pitot/static systems
 - direct reading compasses
 - piston engine and gas turbine engine indication systems
 - electrical systems indication
 - basic fuel quantity indication systems
 - vacuum indication systems
- applying logic processes, taking and interpreting system 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
- applying OHS requirements relevant to instrument system maintenance

Required knowledge

Look for evidence that confirms knowledge of:

- component attachment methods
- connection of hardware and plugs
- handling precautions for electrostatic sensitive devices
- relevant OHS practices
- the basic layout (block diagram level), function and operation of the following systems as listed in the Range Statement:
 - pitot/static systems
 - piston engine and gas turbine engine direct reading indication systems
 - basic fuel quantity measurement systems
- the operating principles of the above systems and associated with:
 - atmospheric conditions; properties and effects on aircraft instruments and systems

- pressure and temperature sensing elements and their use in aircraft instruments
- gyroscopes and their use in aircraft instrument systems
- electrical fundamentals
- instrument construction and operation:
 - instrument groupings, panel layout and construction
 - pitot static instruments (ASI, VSI and counter-pointer altimeters), their operation, calibration safe handling and related terminology
 - pitot pressure
 - static pressure
 - altimeter Q code settings:
 - QNH
 - QNE
 - QFE
 - IAS
 - TAS
 - vacuum system indication component construction and operation
 - air and electrically powered artificial horizon construction and operation
 - directional gyro construction and operation
 - construction and operation of direct reading engine instruments
 - turn and bank and slip/turn coordinator construction and operation
 - direct reading compass construction and compass calibration
 - piston and gas turbine engine direct reading measuring instruments and temperature indication instruments construction and operation
 - voltage and current measuring instrument construction and operation
 - volumetric fluid quantity system components, construction and operation
- instrument system maintenance requirements and troubleshooting procedures, including pitot/static system leak testing
- relevant maintenance documentation and maintenance publications
- 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 instrument systems and remove and install components 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) and component removal and installation associated with aircraft basic instrument 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.</p> <p>Evidence of transferability of skills and knowledge related to inspection, testing and troubleshooting is essential. This is to be demonstrated through application across a range of basic aircraft instrument 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 a system and at least one major system component/LRU from each of Groups 1 to 8 listed 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.</p>
<p>Context of and specific resources for</p>	<p>Competency should be assessed in the work environment</p>

assessment	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 instrument systems and system components	<p>Instrument systems and system components include:</p> <ol style="list-style-type: none"> 1. Pitot/static systems and components, ASI, VSI and counter-pointer altimeters 2. DGs and AHs (air and electrically driven) 3. Turn and bank and slip/turn coordinators 4. Direct reading compasses 5. Piston engine and gas turbine engine indication system components (direct reading measuring instruments and temperature indication) 6. Electrical systems indication (voltage and current) 7. Basic fuel quantity indication systems and components 8. Vacuum indication components
Troubleshooting	Troubleshooting involves the use of fault-finding charts or similar, to line replacement level
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