Australian Government

Department of Education, Employment and Workplace Relations

# MEA313C Inspect, test and troubleshoot piston engine systems and components

**Revision Number: 1**

# MEA313C Inspect, test and troubleshoot piston engine systems and components

## Modification History

Not applicable.

## Unit Descriptor

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| **Unit descriptor** | This unit is part of the Mechanical Certificate IV AME training pathway. It covers the competencies required to inspect, test and troubleshoot the systems and components of piston engines. Where a CASA licensing outcome is sought this unit forms part of the CASA requirement for the granting of the chosen Aircraft Maintenance Engineer Licence under CASR Part 66, in accordance with the licensing provisions in Section 3, Assessment Guidelines. |

## Application of the Unit

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| **Application of the unit** | This unit requires application of hand skills, the use of maintenance publications and knowledge of piston engine and system theory to inspect, test and troubleshoot piston engines and engine system components.<br>Applications include fixed and rotary wing aircraft. |

## Licensing/Regulatory Information

Not applicable.

## Pre-Requisites

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| **Prerequisite units** | | |
| | MEA306C | Remove and install engine systems and components |
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# Employability Skills Information

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| **Employability skills** | This unit contains employability skills. |

# Elements and Performance Criteria Pre-Content

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| 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. |

# Elements and Performance Criteria

| ELEMENT | PERFORMANCE CRITERIA |
|---|---|
| 1. Inspect piston engine system and components | 1.1. Isolation tags already attached to the system or related systems are checked and aircraft/engine configured for safe system inspection and operation in accordance with applicable maintenance manual.<br>1.2. *Piston engine* and/or components are visually or physically checked for external and internal signs of defects in accordance with applicable maintenance manual. |
| 2. Test piston engine system. | 2.1. Aircraft and ***engine system*** are correctly prepared in accordance with applicable maintenance manual and connected to appropriate test equipment.<br>2.2. Built-in system test functions and status displays are activated, where applicable, outputs recorded and interpreted.<br>2.3. Assistance is provided with engine and/or system operation during prescribed test procedures to establish serviceability and correct function in accordance with applicable maintenance manual. |
| 3. Prepare for troubleshooting | 3.1. Relevant maintenance documentation and modification status, including system defect reports where relevant are used to identify an unserviceability. |
| 4. Troubleshoot piston engine system | 4.1. Available information from maintenance documentation and inspection and test results is used, where necessary, to assist in fault determination.<br>4.2. Maintenance manual fault diagnosis guide and logical processes are used to ensure efficient and accurate ***troubleshooting***.<br>4.3. Specialist advice is obtained, where required, to assist with the troubleshooting process.<br>4.4. Piston engine system faults are located and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required.<br>4.5. Fault rectification requirements are determined to assist in planning the repair. |

# 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) procedures including the use of Material Safety Data Sheets and personal protective equipment (PPE)
- The use of relevant maintenance documentation and aircraft manuals
- Through visual/physical inspection, recognising external and internal signs of defects in piston engines, components and system components
- Assisting with testing of piston engine and engine system operation, be able to operate systems, monitor indications, record parameters and recognise correct function
- Compiling engine condition monitoring records
- Rigging and adjusting engine controls and systems
- Using fault diagnosis guides and equivalent data to accurately and efficiently troubleshoot the causes of unserviceabilities in piston engines and engine systems, clearly record details and identify the required rectification actions.

**Required knowledge**

Look for evidence that confirms knowledge of:

- OHS procedures associated with piston engine maintenance, including lifting and handling of heavy objects
- How to obtain MSDS
- Use of PPE

Fault diagnosis techniques

- Piston engine and engine system layout and operation:
  - four stroke engine theory of operation and performance
  - cylinder configurations
  - construction - components and materials
  - carburettors and air induction systems
  - fuel injection systems
  - fuels and their characteristics
  - ignition systems
  - lubricating systems and lubricants
  - cooling systems
  - exhaust systems
  - superchargers and turbochargers

**REQUIRED SKILLS AND KNOWLEDGE**

- accessory drives and mounts
- controls and rigging of controls
- piston engine maintenance requirements and troubleshooting procedures including ground running of engines

- System component operation including electrical and instrument system interfaces:
  - magnetos and ignition harnesses
  - spark plugs
  - fuel pumps
  - fuel filters
  - oil pumps
  - oil filters
  - oil tanks
  - vacuum pumps and air pumps
  - generators
  - starter motors
  - oil pressure gauges (direct reading)
  - temperature gauges (direct reading)
  - tachometers
  - manifold pressure gauges
  - system and component maintenance requirements and troubleshooting procedures
- Relevant maintenance manuals
- Relevant regulatory requirements and standard procedures

# Evidence Guide

| EVIDENCE GUIDE | |
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| 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 apply hand skills, use maintenance publications and engine and system theory knowledge to inspect, test and troubleshoot piston engines and engine system components on fixed or rotary wing aircraft while applying 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 inspection, testing and troubleshooting applications (including the timely involvement of supervisor or other trades) associated with engine systems. It is essential that system testing procedures take into account all safety precautions associated with piston engine system operation, and that awareness be demonstrated of dual inspection requirements associated with work on engine controls. Evidence of transferability of skills and knowledge related to inspection, testing and troubleshooting is essential. This may be demonstrated through application across a number of engine systems or types. Ability to interpret inspection procedures and specifications (allowable limits) and apply them in practice is critical. The application of testing procedures and functional rigging checks should also indicate knowledge of system operation. Engine system operation knowledge, the relationship of individual components and the links with other systems will be necessary to supplement evidence of ability to carry out rigging checks and troubleshoot the system 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.<br>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 at least one item from each of Groups 1 to 5 listed in the Range Statement. This shall be established via the records in the Log of Industrial Experience and |

| EVIDENCE GUIDE | |
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| | Achievement or, where appropriate, an equivalent Industry . |
| **Context of and specific resources for assessment** | Competency should be assessed in the work environment or simulated work environment using tools and equipment specified in aircraft maintenance manuals. It is also expected that general purpose tools, test and ground support equipment found in most routine situations would be used where appropriate. The level of troubleshooting is limited in its application to the use of fault diagnosis guides or other similar information. |
| **Method of assessment** | Testing of engines fitted to helicopters (where auxiliary drive is not available) may be carried out through the applicant directing a pilot qualified on type. |
| **Guidance information for assessment** | |

# Range Statement

| RANGE STATEMENT | |
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| 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. | |
| **Note** | Range statements listed below are numbered to facilitate specification of the assessment requirements included in the Evidence Guide. |
| **Piston engines and engine systems** | *Piston engines and engine systems may include*:<br>1. Engine (all types), main components, accessories/drives<br>2. Control system<br>3. Ignition, starter systems<br>4. Fuel, air systems, super/turbo chargers<br>5. Oil system |
| **Troubleshooting** | *Troubleshooting* involves the use of fault finding charts or similar, to line replacement level. |
| **Application** | Application of this unit may relate to:<br>• Scheduled or unscheduled maintenance activities<br>• Individual or team related activities |
| **Procedures and requirements** | Refer to industry standard procedures specified by manufacturers, regulatory authorities or the enterprise |

# Unit Sector(s)

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| **Unit sector** | |

# Competency field

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| **Competency field** | Aviation maintenance |

# Co-requisite units

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| **Co-requisite units** | | |
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